SMITHSONIAN INSTITUTION

Contributions from the United States National Herbarium
Volume 52: 1-415

Monocotyledons and Gymnosperms of Puerto Rico and the Virgin Islands

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2005

ABSTRACT

Acevedo-Rodríguez, Pedro and Mark T. Strong. Monocots and Gymnosperms of Puerto Rico and the Virgin Islands. *Contributions from the United States National Herbarium*, volume 52: 415 pages (including 65 figures). The present treatment constitutes an updated revision for the monocotyledon and gymnosperm flora (excluding Orchidaceae and Poaceae) for the biogeographical region of Puerto Rico (including all islets and islands) and the Virgin Islands. With this contribution, we fill the last major gap in the flora of this region, since the dicotyledons have been previously revised. This volume recognizes 33 families, 118 genera, and 349 species of Monocots (excluding the Orchidaceae and Poaceae) and three families, three genera, and six species of gymnosperms. The Poaceae with an estimated 89 genera and 265 species, will be published in a separate volume at a later date. When Ackerman's (1995) treatment of orchids (65 genera and 145 species) and the Poaceae are added to our account of monocots, the new total rises to 35 families, 272 genera and 759 species. The differences in number from Britton's and Wilson's (1926) treatment is attributed to changes in families, generic and species concepts, recent introductions, naturalization of introduced species and cultivars, exclusion of cultivated plants, misdeterminations, and discoveries of new taxa or new distributional records during the last seven decades. Seven new taxa are described: ***Agave minor*** Proctor, ***Bulbostylis capillaris*** subsp. ***insulana*** M.T. Strong, ***Cyperus pulguerensis*** M.T. Strong, ***Guzmania lingulata*** var. ***concolor*** Proctor & Cedeño-Mald., ***Pitcairnia angustifolia*** var. ***simplicior*** Proctor & Cedeño-Mald., ***Pitcairnia jareckii*** Proctor & Cedeño-Mald., and ***Zephyranthes proctorii*** Acev.-Rodr. & M.T. Strong; and two new combinations are made: ***Cyperus subtenuis*** (Kük.) M.T. Strong and ***Rhynchospora divaricata*** (Ham.) M.T. Strong. Twenty one of the accepted names (or their basionyms) in this work are lectotypified: ***Aechmea lingulata*** (L.) Baker, ***Aechmea nudicaulis*** (L.) Griseb., ***Alocasia plumbea*** Van Houtte, ***Crocosmia*** × ***crocosmiiflora*** (Lemoine ex Morren) N.E. Brown, ***Cyperus confertus*** Sw., ***Cyperus subtenuis*** (Kük.) M.T. Strong, ***Cyperus urbanii*** Boeck., ***Eleocharis rostellata*** (Torr.) Torr., ***Guzmania monostachia*** (L.) Mez, ***Heteranthera limosa*** (Sw.) Willd., ***Heteranthera reniformis*** Ruiz & Pav., ***Hohenbergia antillana*** Mez., ***Neomarica northiana*** (Schneev.) Sprague, ***Rajania cordata*** L., ***Rhynchospora ciliata*** (G. Mey.) Kük., ***Rhynchospora odorata*** C. Wright ex Griseb., ***Spathiphyllum wallisii*** Regel, ***Tillandsia fasciculata*** Sw., ***Tillandsia polystachya*** (L.)L., and ***Xanthosoma helleborifolium*** (Jacq.) Schott. Four names are neotypified: ***Caladium bicolor*** (Aiton) Vent., ***Eleutherine bulbosa*** (Mill.) Urb., ***Smilax coriacea*** Spreng., and ***Spirodela polyrhiza*** (L.) Schleid. One name is epitypified: ***Anthurium scandens*** (Aubl.) Engl. Fifteen synonyms of accepted taxa are lectotypified: ***Amaryllis equestris*** Aiton, ***Bulbostylis curassavica*** var. ***pallescens*** Kük. & Ekman ex Urb., ***Bulbostylis ekmanii*** Kük., ***Bulbostylis papillosa*** Kük., ***Crinum amabile*** Donn ex Ker-Gawl, ***Cyperus ehrenbergii*** Kunth, ***Cyperus filiformis*** var. ***densiceps*** Kük., ***Eleocharis sintenisii*** Boeck., ***Pistia occidentalis*** Blume, ***Pitcairnia ramosa*** J. Jacq., ***Psilocarya rufa*** Nees, ***Rhynchospora longispicata*** Boeck., ***Scleria microcarpa*** var. ***subeciliata*** C.B.Clarke, ***Scleria grisebachii*** C.B. Clarke, and ***Xanthosoma atrovirens*** K. Koch & Bouché. Thirty-two of the taxa treated are newly reported for the flora area: *Aechmea fasciata* (Lindl.) Baker, *Agave vivipara* L., *Bulbostylis stenocarpa* Kük., *Calathea crotalifera* S. Watson, *Carex longii* Mack., *Commelina rufipes* var. *glabrata* (D.R. Hunt) Faden & D.R. Hunt, *Costus malortieanus* H. Wendl., *Costus scaber* Ruiz & Pav., *Cyperus floridanus* Britton ex Small, *Cyperus papyrus* L., *Cyperus squarrosus* L., *Cyperus tenuis* Sw., *Cyperus unifolius* Boeck., *Eleocharis debilis* Kunth, *Eleocharis minutiflora* Boeck., *Eleocharis oligantha* C.B. Clarke, *Fuirena robusta* Kunth, *Furcraea stratiotes* J. B. Petersen, *Halophila engelmannii* Asch., *Heliconia rostrata* Ruiz & Pav., *Hydrocleys nymphoides* (Willd.) Buchenau, *Kyllinga nemoralis* (J.R. & G. Forst.) Dandy ex Hutchinson & Dalz., *Maranta gibba* Sm., *Rhynchospora domingensis* Urb., *Rhynchospora fascicularis* subsp. *fascicularis* var. *distans* (Michx.) Chapm., *Rhynchospora radicans* subsp. *microcephala* (Bertero ex Spreng.) W.W. Thomas, *Ruppia didyma* Sw., *Scleria brittonii* Core, *Scleria havanensis* Britton, *Scleria verticillata* Muhl. ex Willd., *Spathiphyllum wallisii* Regel., and *Xyris curtissii* Malme.

KEY WORDS: Botany, Caribbean, Greater Antilles, Greater Puerto Rico, Gymnosperms, Monocots, Puerto Rico,Virgin Islands.

RESUMEN

Acevedo-Rodríguez, Pedro y Mark T. Strong. Monocots and Gymnosperms of Puerto Rico and the Virgin Islands. *Contributions from the United States National Herbarium*, volume 52: 415 páginas (incluyendo 65 figuras). El presente tratado constituye una revisión actualizada para los monocotiledóneos y los gimnospermos (excluyendo Orchidaceae y Poaceae) de la región biogeográfica de Puerto Rico (incluyendo cayos e islotes) y las Islas Vírgenes. En este volumen, se reconocen 33 familias, 118 géneros y 349 especies de monocotiledóneos y tres familias, tres géneros y seis especies de gimnospermos. Las Poaceas con un estimado de 89 géneros y 265 especies será publicada en un próximo volumen de esta serie. Cuando el numero (65 géneros y 145 especies) de Orquídeas (Ackerman, 1995) y el de Poaceas es tomado en consideración, el numero total de monocotiledóneas asciende a 35 familias, 272 géneros y 759 especies. La diferencia en el numero de especies entre el presente tratado y el de Britton y Wilson (1926) es atribuido a los cambios de conceptos de familias, géneros y especies, recientes introducciones, naturalización de especies anteriormente introducidas, la exclusión de plantas cultivadas, identificaciones erróneas y el descubrimiento de nuevos taxones o de nuevos registros de distribución en las ultimas 7 décadas. Los siguientes siete nuevos taxones son aquí descritos: ***Agave minor*** Proctor, ***Bulbostylis capillaris*** subsp. ***insulana*** M.T. Strong, ***Cyperus pulguerensis*** M.T. Strong, ***Guzmania lingulata*** var. ***concolor*** Proctor & Cedeño-Mald., ***Pitcairnia angustifolia*** var. ***simplicior*** Proctor & Cedeño-

Mald., ***Pitcairnia jareckii*** Proctor & Cedeño-Mald. y ***Zephyranthes proctorii*** Acev.-Rodr. & M.T. Strong, y dos combinaciones nuevas efectuadas: ***Cyperus subtenuis*** (Kük.) M.T. Strong y ***Rhynchospora divaricata*** (Ham.) M.T. Strong. Los siguientes 21 nombres (o sus basónimos) aquí aceptados son lectotipificados: ***Aechmea lingulata*** (L.) Baker, ***Aechmea nudicaulis*** (L.) Griseb., ***Alocasia plumbea*** Van Houtte, ***Crocosmia × crocosmiiflora*** (Lemoine ex Morren) N.E. Brown, ***Cyperus confertus*** Sw., ***Cyperus subtenuis*** (Kük.) M.T. Strong, ***Cyperus urbanii*** Boeck., ***Eleocharis rostellata*** (Torr.) Torr., ***Guzmania monostachia*** (L.) Mez, ***Heteranthera limosa*** (Sw.) Willd., ***Heteranthera reniformis*** Ruiz & Pav., ***Hohenbergia antillana*** Mez., ***Neomarica northiana*** (Schneev.) Sprague, ***Rajania cordata*** L., ***Rhynchospora ciliata*** (G. Mey.) Kük., ***Rhynchospora odorata*** C. Wright ex Griseb., ***Spathiphyllum wallisii*** Regel, ***Tillandsia fasciculata*** Sw., ***Tillandsia polystachya*** (L.) L., y ***Xanthosoma helleborifolium*** (Jacq.) Schott. Cuatro nombres son neotipificados: ***Caladium bicolor*** (Aiton) Vent., ***Eleutherine bulbosa*** (Mill.) Urb., ***Smilax coriacea*** Spreng., y ***Spirodela polyrhiza*** (L.) Schleid. Un nombre es epitipificado: ***Anthurium scandens*** (Aubl.) Engl.. Los siguientes quince sinónimos son lectotificados: ***Amaryllis equestris*** Aiton, ***Bulbostylis curassavica*** var. ***pallescens*** Kük. & Ekman ex Urb., ***Bulbostylis ekmanii*** Kük., ***Bulbostylis papillosa*** Kük., ***Crinum amabile*** Donn ex Ker-Gawl, ***Cyperus ehrenbergii*** Kunth, ***Cyperus filiformis*** var. ***densiceps*** Kük.,***Eleocharis sintenisii*** Boeck., ***Pistia occidentalis*** Blume, ***Pitcairnia ramosa*** J. Jacq., ***Psilocarya rufa*** Nees, ***Rhynchospora longispicata*** Boeck., ***Scleria microcarpa*** var. ***subeciliata*** C.B. Clarke, ***Scleria grisebachii*** C.B. Clarke y ***Xanthosoma atrovirens*** K. Koch & Bouché. Los siguientes 32 taxones son nuevos registros para el área cubierta en esta flora: *Aechmea fasciata* (Lindl.) Baker, *Agave vivipara* L., *Bulbostylis stenocarpa* Kük., *Calathea crotalifera* S. Watson, *Carex longii* Mack., *Commelina rufipes* var. *glabrata* (D.R. Hunt) Faden & D.R. Hunt, *Costus malortieanus* H. Wendl., *Costus scaber* Ruiz & Pav., *Cyperus floridanus* Britton ex Small, *Cyperus papyrus* L., *Cyperus squarrosus* L., *Cyperus tenuis* Sw., *Cyperus unifolius* Boeck., *Eleocharis debilis* Kunth, *Eleocharis minutiflora* Boeck., *Eleocharis oligantha* C.B. Clarke, *Fuirena robusta* Kunth, *Furcraea stratiotes* J. Boye-Petersen, *Halophila engelmannii* Asch., *Heliconia rostrata* Ruiz & Pav., *Hydrocleys nymphoides* (Willd.) Buchenau, *Kyllinga nemoralis* (J.R. & G. Forst.) Dandy ex Hutchinson & Dalz., *Maranta gibba* Sm., *Rhynchospora domingensis* Urb., *Rhynchospora fascicularis* subsp. *fascicularis* var. *distans* (Michx.) Chapm., *Rhynchospora radicans* subsp. *microcephala* (Bertero ex Spreng.) W.W. Thomas, *Ruppia didyma* Sw., *Scleria brittonii* Core, *Scleria havanensis* Britton, *Scleria verticillata* Muhl. ex Willd., *Spathiphyllum wallisii* Regel. y *Xyris curtissii* Malme.

PALABRAS CLAVES: Antillas Mayores, Banco de Puerto Rico, Botánica, Caribe, Gimnospermos, Islas Vírgenes, Monocotiledóneos y Puerto Rico.

DATE OF PUBLICATION: 30 November 2005

Cover Design by Alice Tangerini based on illustrations by Bobbi Angell. Front cover: *Crinum zeylanicum* and *Hymenocallis latifolia*. Back cover: *Scleria canescens*, *S. scindens*, and *S. secans*.

Contributions from the United States National Herbarium (ISSN 0097-1618) Department of Botany, National Museum of Natural History, MRC-166, Smithsonian Institution, Washington, DC, 20013-7012, USA.

POSTMASTER: Send address changes to Contributions from the U.S. National Herbarium, Department of Botany, National Museum of Natural History, MRC-166, P.O. Box 37012, Smithsonian Institution, Washington, DC, 20013-7012, USA.

The paper used in this publication meets the minimum requirements of the American National Standard for Permanence of Paper for Printed Library Materials Z39.48—1984.

The periodical, Contributions from the United States National Herbarium, was first published in 1890 by The United States Department of Agriculture. From 1 July 1902 forward it was published as a Bulletin of the United States National Museum. The series was discontinued after volume 38 (1974), and has been revived with volume 39 (2000) as a venue for publishing longer taxonomic papers, checklists, floras, and monographs, produced by the staff and associates at the U.S. National Herbarium. It is externally peer reviewed, and published at irregular intervals. Subscription and other correspondence should be addressed to CUSNH, Department of Botany, National Museum of Natural History, MRC-166, Smithsonian Institution, Washington, DC, 20013-7012, USA e-mail: CUSNH@si.edu. The present issue is available for free while supplies last and PDF files of the most recent issues (vol. 49-present) of the Contr. U.S. Natl. Herb. are available at: http://www.nmnh.si.edu/botany/pubs/CUSNH/ If you have any questions about manuscript submission or comments on previous volumes, please contact the editor, Paul M. Peterson (peterson@si.edu).

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FAMILY SEQUENCE

GYMNOSPERMS

1. Podocarpaceae
2. Pinaceae
3. Zamiaceae

MONOCOTYLEDONS

1. Araceae
2. Lemnaceae
3. Limnocharitaceae
4. Alismataceae
5. Hydrocharitaceae
6. Cymodoceaceae
7. Ruppiaceae
8. Potamogetonaceae
9. Smilacaceae
10. Dioscoreaceae
11. Burmanniaceae
12. Hypoxydaceae
13. Iridaceae
14. Amaryllidaceae
15. Agavaceae
16. Asparagaceae
17. Dracaenaceae
18. Asphodelaceae
19. Arecaceae (Palmae)
20. Commelinaceae
21. Haemodoraceae
22. Pontederiaceae
23. Musaceae
24. Heliconiaceae
25. Zingiberaceae
26. Costaceae
27. Cannaceae
28. Maranthaceae
29. Bromeliaceae
30. Xyridaceae
31. Juncaceae
32. Cyperaceae
33. Thyphaceae

Monocotyledons and Gymnosperms of Puerto Rico and the Virgin Islands

Editors: Pedro Acevedo-Rodríguez[1] and Mark T. Strong[1]

INTRODUCTION

The *Botany of Porto Rico and the Virgin Islands* by Britton and P. Wilson (1923-26) treated 27 families, 220 genera and 503 species of monocots plus two families, two genera and four species of gymnosperms. Modern revisions (this volume, Ackerman, 1995, and Peterson et al. in prep.) of the biogeographical Puerto Rican flora recognize 35 families, 272 genera and 759 species of monocots, and three families, three genera, and six species of gymnosperms. The differences in number is attributed to changes in families, generic and species concepts, recent introductions, naturalization of introduced species and cultivars, exclusion of cultivated plants, misdeterminations, and discoveries of new taxa or new distributional records during the last four decades.

Botanical research in Puerto Rico and the Virgin Islands has lagged behind that carried out on other islands of the Caribbean and in the New World. In 1753 when Linnaeus published his Species Plantarum describing approximately 9,000 plant species of the world, only two species were reported for Puerto Rico and one for the island of St. Croix. These numbers contrast with those from Jamaica with 135 species, the Lesser Antilles (including Curaçao and Bonaire) with 75, Hispaniola with 20, and Cuba with seven species reported. It wasn't until the latter part of the 18th century that botanical explorations started in earnest in Puerto Rico and the Virgin Islands. The first significant botanical expedition carried out on Puerto Rican territory was by F. Bredermeyer (1758-1839), part of an Austrian expedition lead by F. J. Maerter (1753-1827), whose collections are deposited in the Museum of Natural History of Vienna (W). In the following years many more botanists visited Puerto Rico or the Virgin Islands; their collections form the basis for the description of new genera or species as part of an ongoing effort to inventory the plants of the world.

The first attempt to write a floristic treatment for any of the islands belonging to our region was started at the beginning of the 19th century. From 1828-31, Schlechtendal (1794-1866) published the first florula for the island of St. Thomas, treating 360 species. This effort was followed with a paper by Krebs in 1847, who contributed additional species for the flora of St. Thomas. In 1879, von Eggers (1844-1903) published a florula of St. Croix, listing 1,028 species for an island that is only slightly larger than St. Thomas. A few years later, the first partial florula for Puerto Rico was published by D. Bello y Espinosa (1817-1884) from 1880 to 1883, listing 964 species of plants, some of which were new to science. His work was essentially an annotated checklist, based mostly on Bello's herbarium specimens that were later destroyed by insects. Bello had collaborated with L. Krug (1833-1898), an amateur naturalist and German consul stationed in Mayagüez, but the checklist was published only with Bello's authorship. Krug produced three unpublished manuscripts (destroyed by a fire in the library of the Botanical Museum in Berlin): a treatise on vernacular names of Puerto Rican plants, a catalog of West Indian plants, and most importantly, a volume illustrating some common Puerto Rican plants.

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The first serious attempt to write a full-fledged flora of Puerto Rico came from A. Stahl (1842-1917), who from 1883-88 published six fascicles of various groups of flowering plants. His work was never finished as his treatment of the monocotyledons and approximately 720 watercolors of Puerto Rican plants were never published. Although Stahl based his descriptions chiefly on live plants, he also collected approximately 1,330 dried specimens (with several duplicates) dating from 1882 to 1889. His collections were not cataloged in chronological sequence and it is therefore difficult to interpret his itinerary or whether he preserved specimens while writing his flora. The first set of his collections went to Berlin (Krug and Urban herbarium) and were destroyed during World War II. Duplicates of his collections are known to exist at various institutions as follows: B(6), BR(1), C(9), G(1), GH(1), GOET(6), L(7), M(1), NY(1), S(130), TO(2), and US(48). Stahl's collections are important because they constitute early records for many native and introduced plants in Puerto Rico, some of which have never been recollected. His collections were the basis for numerous studies, some of them resulting in taxa new to science. Stahl described several new species himself (most of which are considered synonyms by modern botanists), but further study is necessary to assess whether his collections or his illustrations (watercolors) constitutes a type.

Around the time when Stahl's flora was being published, Paul Sintenis (1847-1907), a German botanist, arrived in Puerto Rico and collected on the island from 1884 to 1887. Sintenis was the most prolific collector in early Puerto Rican botany, with approximately 8,000 collections. His collections are very important because they contained large sets of duplicates that were distributed to numerous herbaria of the world, thus facilitating the study of Puerto Rican plants by a wide range of specialists. Many of his collections were designated as types of taxa new to science. His collections are equally important as early records of introduced plants and as a representation of the floristic content of an area from that time. It is very likely that Sintenis and Stahl collected together, as can be deduced from their collections which often represent the same species collected at the same site and on the same date. Sintenis' first set of Puerto Rican plants went to Berlin (Krug and Urban Herbarium) but were largely destroyed during World War II. Surviving collections are found in numerous herbaria.

By the close of the 19th century and beginning of the 20th century, even more botanists were actively studying and describing the flora of the West Indies. The most memorable and relevant ones to the flora of Puerto Rico and the Virgin Islands were I. Urban (1848-1931) and N. L. Britton (1859-1934). Urban published hundreds of scientific papers, many of which dealt with West Indian Botany. His Symbolae Antillanae, published in nine volumes from 1898 to 1928, still constitutes a fundamental and necessary work for the study of West Indian plants. Volume 4 (1903-11) of this series is dedicated to the flora of Puerto Rico, where numerous novelties were described either by him or by his numerous contributors. This work, although an excellent source of botanical bibliography and rigorous nomenclatural treatment, did not contain keys that would have facilitated its use by the non-expert or local botanist.

From 1923-1926, Britton, then director of the New York Botanical Garden, published along with P. Wilson (1879-1944) the first full-fledged flora for the region of Puerto Rico and the Virgin Islands. They treated the flowering plants while W. R. Maxon (1877-1948), in volume 6(3) 1926, treated the Pteridophytes. Their work, although outdated, still constitutes one of the basic references for the study of Puerto Rican (and Virgin Islands) botany.

During the decade of the 1960's, A. Liogier started his work on the revision of the Puerto Rican flora, reporting numerous novelties as well as new records for the island. From 1985 to 1997 he published a new dicotyledon flora for Puerto Rico in five volumes, but did not cover the Virgin Islands in his treatments. In 2000, along with L. F. Martorell, Liogier published a revised edition to his synopsis for the Flora of Puerto Rico and adjacent islands, a checklist that lists all the vascular plants that occur on the islands under the jurisdiction of Puerto Rico. Their work includes a list of the monocots as well, but in the present work we have made substantial revisions to their nomenclature and species concepts.

The present treatment constitutes an updated revision for the monocot (except for the Poaceae and the Orchidaceae) and gymnosperm flora for the biogeographical region of Puerto Rico (including all islets and islands) and the Virgin

Islands. With this contribution, we fill one of the last major gaps in the flora of this region, since other groups have been recently revised. The dicotyledon flora was treated by H. Alain Liogier & Martorell (1982, 2000) and by H. Alain Liogier (1985, 1988, 1994, 1995, 1997), the Pteridophytes by George R. Proctor (1989), and the orchids by James D. Ackerman (1992, 1995). The last remaining untreated group is the Poaceae, which will be treated by P.M. Peterson and collaborators in a separate work to be published in a forthcoming volume of this series. We follow the approach of Britton and P. Wilson (1923-26) and others (e.g., Proctor 1989, Ackerman 1995) in treating these islands as a biogeographical region instead of a flora dictated by political boundaries.

BRIEF HISTORY OF THE PROJECT

This project was started about two decades ago by Dr. George R. Proctor while working on his treatment for the Ferns of Puerto Rico and the Virgin Islands (1989). His position as a plant taxonomist at the Department of Natural Resources, San Juan, Puerto Rico (DRN) provided him with the opportunity to explore the island and to document its flora by collecting and preserving thousands of specimens. The first set of his Puerto Rican collections form the core of the SJ herbarium, while duplicates of his collections are distributed in several herbaria such as IJ, NY, and US. During his stay in Puerto Rico, Dr. Proctor collected numerous monocotyledons with the idea of producing a treatment for this important group of plants. Many of the new records reported and new taxa described in this volume are based on his collections. In early 1998, after retiring from DRN, Dr. Proctor came to the Smithsonian Institution as a Visiting Scientist, sponsored by an Andrew W. Mellon Foundation Fellowship to work on a treatment for the monocots of Puerto Rico and the Virgin Islands. Dr. Proctor spent a year and a half at our Institution with additional support from the U.S. Department of Interior, Fish & Wildlife Service. By the end of his visit, he produced the basis for the current publication. Several other workers contributed treatments to this volume, including students and various staff of the Department of Botany, Smithsonian. The editors of this volume checked the accuracy of treatments, sometimes enriching descriptions, providing typification information, solving nomenclatural problems, and citing the numerous collections deposited at SJ, NY, UPR, UPRRP, and US. The Gymnosperms were later added in order to fill a major gap in the knowledge of the flora area. After approximately five years of continuous work, we bring this volume to fruition.

METHODOLOGY

All taxa fully treated in this work are based on a specimen in an herbarium. These are indicated by **bold face** type. Synonyms are indicated by *italisizing* the names of taxa that have been used in major treatments for the islands: Urban's Flora Portoricensis (1903, 1905, 1910, 1911) and Britton and P. Wilson's Scientific Survey of Puerto Rico and the Virgin Islands (1923, 1924). Names misapplied to a species by an author are indicated in the sense (sensu) of the author followed by the true author of the name and date of publication. Names for species that could not be verified with a specimen are listed at the end of the corresponding genus under the heading: "Excluded species." Major herbaria known to have extensive holdings of plants from Puerto Rico and the Virgin Islands were consulted to document the occurrence and distribution of the taxa treated here. The distribution (political divisions) given for each species is based on specimen records from the following herbaria: GH, GMUF, MAPR, MO, NA, NY, SJ, UPR, UPRRP, and US. The selected specimens cited for each species are provided as a guide to the variability within each species and in most cases do not include all of the material examined. Herbarium abbreviations within the text follow Index Herbariorum (Holmgren et al. 1990). Abbreviations of author names follows Brummitt & Powell (1992). Names of taxa that appear in brackets in the keys indicate they are cultivated but not naturalized or persistent in natural areas.

ACKNOWLEDGEMENTS

We thank P. Acevedo Torres for locating representative material of Musaceae and Araceae cultivars; Franklin Axelrod (UPRRP) for careful review of the manuscript especially of name

citations, answering numerous inquiries, and facilitating loan of specimens; Ronald Brashear and Kirsten van der Veen of the NMAH Dibner Library for facilitating the use of the rare books collection; James Ackerman (UPRRP) and Bruce Hansen (USF) for reviewing and improving the manuscript; Richard Carter (VSC) for helping to identify a *Cyperus* collection; Dwight Colón (SJ) for searching and providing information on some of the specimens housed at SJ; Mia Ehn for data on Cyperaceae type collections at C; Amy Farstad and John Kartesz (NCU) for information on Cyperaceae records for Puerto Rico; Socorro González-Elizondo (CIIDIR) for discussions on *Eleocharis*; Gerda Huisman (Universiteits-bibliotheek, Groningen) for valuable help in locating and providing images of several illustrations of Plumier's Codex Boerhaavianus; Charles Jarvis (BM) for answering inquiries regarding Linnean names typification; Robert Kral (BRIT) for insightful discussions on *Bulbostylis* taxonomy; Alexander Krings (NCSU) for translating relevant German text into English; Paul and Hiltjie Maas (U) for information on the lectotypification of *Canna indica*; Rachel Newton for data on Cyperaceae type photographs at F; Dan Nicolson (US) and K. Gandhi (GH) for help in solving numerous questions on nomenclature and literature citation; Leslie Overstreet and Daria Wingreen of the NMNH Cullman Library for facilitating the use of numerous rare books; Lauren Raz (NY) for discussions on *Dioscorea* taxonomy and *Rajania* typification; Amneris Siaca for transcribing Proctor's manuscript into electronic format; Gerald Smith (High Pt University, NC), for discussions on *Hymenocallis* taxonomy; Dennis Stevenson (NY) and Vivian Negrón-Ortiz (MU) for discussions regarding taxonomy of *Zamia*; Jeanine Vélez (MAPR) for answering inquiries, facilitating loans of material, and pulling specimens at NY; John Weirsema (USDA) for information regarding conservation of economically important monocots; J. Carlos Trejo (UPR) for answering numerous inquiries concerning collections at UPR; Taina Litwak for preparing many of the line drawings; Bobbi Angell for authorizing reprinting many of her illustrations here published; and Alice Tangerini for preparing several line drawings, support on image handling, and for designing the cover. We would like to thank the following herbaria for making their collections accessible either through loans or by imaging: BM, C, CGE, GH, JBSD, MAPR, MO, NCU, NY, P, SJ, UPR, and UPRRP. We greatfully acknowledge financial assistance from the **Andrew W. Mellon Foundation** for providing fellowships to George R. Proctor, José A. Cedeño-Maldonado, and Patrick Lewis for work at the Smithsonian Institution (NMNH); the **U. S. Fish and Wildlife Service** to George R. Proctor for additional time required for the completion of this project; the **International Institute of Tropical Forestry** for support of field work and inventorying of the Puerto Rican plant collections housed at US, and the **USDA-Forest Service** for helping with publication costs.

FLORISTIC TREATMENT

Key to the taxa

1. Plants woody, usually resinous; perianth absent; stigmas absent; ovules exposed during pollination; seeds naked, borne on a fleshy receptacle, or on the surface of cone scales or bracts .... **Gymnosperms**

1. Plants herbaceous or woody; perianth usually present; stigmas present; ovules enclosed in ovaries during pollination; seeds enclosed in a fruit (capsule, follicle, achene, caryopsis, drupe, or berry) 2
   2. Leaves usually reticulate-veined, not sheathing basally; vascular bundles usually in rings or concentric cylinders; flower perianth parts or segments generally 4 or 5 (rarely 3) or multiples thereof; cotyledons 2 ..... (Dicotyledons)
   2. Leaves usually parallel veined or with mid rib only, often sheathing basally; vascular bundles discrete, scattered; flower perianth parts or segments often in whorls of 3, or multiples thereof; cotyledons 1 ..... **Monocotyledons**

GYMNOSPERMS

Key to the families

1. Female cones fleshy with 1 or 2-several scales, drupe-like or nut-like 2
   2. Female cone lacking a fleshy receptacle at base; fertile cone scales 2-several, often with dorsal projections; seeds several per cone ..... [*Cupressaceae*]
   2. Female cone with a fleshy receptacle at base; fertile cone scale 1, lacking a dorsal projection; seed 1 per cone ..... 1. *Podocarpaceae*

1. Female cones woody with numerous scales, not drupe-like or nut-like 3
   3. Leaves simple, needle-like, in fascicles of 2-5 ..... 2. *Pinaceae*
   3. Leaves pinnate or if simple, not needlelike nor in fascicles 4
      4. Leaves pinnate, the pinnae with a mid rib only, lacking lateral longitudinal veins ..... [*Cycadaceae*]
      4. Leaves simple or pinnate, the leaf blades or pinnae lacking a mid rib, but with many longitudinal veins 5
         5. Trees; leaves simple; cones ovoid or subglobose, of spirally-arranged flattened scales ..... [*Araucariaceae*]
         5. Fern-like with a subterranean short trunk or caudex; leaves pinnate; cones cylindrical, of valvately arranged sporophylls ..... 3. *Zamiaceae*

Family 1. **PODOCARPACEAE** *Podocarp Family*

Podocarpaceae Endl., Syn. Conif.: 203. 1847, *nom. conserv.*

by M. T. Strong & P. Acevedo-Rodríguez

Evergreen trees or shrubs, slightly resinous, dioecious or rarely monoecious. Trunks generally erect, simple, columnar, or sometimes branched from near the base. Leaves simple, usually spirally-arranged, sometimes subopposite or opposite and decussate, highly variable in shape, linear, lanceolate, oblong, needle-like, or scale-like, generally with a single midvein but sometimes parallel-veined, soft and flexible, occasionally leathery. Inflorescence composed of separate, unisexual scaly ament- or catkin-like cones (male) and fleshy drupe-like or nut-like cones (female). Male cones cylindrical, solitary or clustered, terminal or axillary, sessile or pedunculate, with spirally-arranged scales, each bearing 2 microsporangia (pollen sacs); pollen grains bearing 2 (-3) air-bladders, sometimes termed "wings". Female cones usually solitary, terminal or sometimes axillary, with a fleshy receptacle at base; fertile cone scales 1-several, each or only one of each bearing one ovule. Mature seeds solitary with a fleshy outer layer or sometimes perched on, or partly embedded in a swollen fleshy or leathery receptacle which is often brightly colored. A family of 17 genera and approximately 170 species, distributed in tropical and antarctic regions worldwide.

TYPE: *Podocarpus* L'Hér. ex Pers.

Reference: Laubenfels, D. J. de. 1986. Coniferales. Pp. 337-453. *In:* Van Steenis, C. G. G. J. & W. J. J. O. De Wilde, (eds.), Fl. Malesiana vol. 10, Noordhoff International Publishing, Leyden, The Netherlands.

1. PODOCARPUS

Podocarpus L'Hérit. ex Pers., Syn. Pl. 2: 580. 1807, *nom. conserv.*

Large evergreen trees or rarely shrubs, usually dioecious. Bark soft, fibrous, yellowish to reddish brown, weathering to gray, usually fissured, often peeling in vertical strips. Leaves spirally-arranged, bifacially flattened, with a single mid rib. Male cones axillary or sometimes terminal, pedunculate. Female cones axillary, on short naked peduncles, ellipsoid-globose, drupe-like with a fleshy or leathery receptacle at base, often apiculate at apex. Seeds green, often glaucous when immature. A genus of approximately 100 species distributed primarily in the southern hemisphere worldwide in tropical or subtropical montane forests and antarctic forest zones.

TYPE: *Podocarpus elongatus* (W. T. Aiton) L'Hérit. ex Pers. (≡ *Taxus elongata* W. T. Aiton), *type conserv.*

1. Podocarpus coriaceus Rich. & A. Rich., Comm. Bot. Conif. Cycad. 14, pl. 1, fig. 3. 1826; *Nageia coriacea* (Rich. & A. Rich.) Kuntze, Revis. Gen. Pl. 2: 800. 1891. Type: Lesser Antilles, Montserrat. Collector unknown. (holotype: probably at P).

Fig. 58. A

Shrub or tree to 20 m tall, divaricately branching, with narrow to spreading crown. Bark smoothish and scaly on new growth, becoming fissured and eventually shaggy and peeling off in brown or gray strips, the inner bark pink. Buds (at branch tips) with long-acuminate scales, these sometimes becoming foliaceous. Leaves crowded, spreading, linear-lanceolate, straight to subfalcate, 4-13 (-17) × 0.8-1.6 (-2) cm, stiff and leathery, semi-glossy, dark green adaxially, green to yellow-green abaxially, long-acuminate or acute with acuminate tip, gradually narrowed to base, short-petiolate, the midvein prominent abaxially, indistinct adaxially, lateral veins not evident. Male cones solitary, sessile, cylindrical, (14-) 20-40 × 4-6 mm, surrounded at base by several broad obtuse scales, yellowish green; microsporophylls sparingly lacerulate, the apex obtusely rounded, often abruptly narrowed to an acute apiculum. Female cones solitary, axillary, peduncles 3-10 mm long,

receptacle red to dark red, fleshy, 2-lobed, 6-10 mm long; scales 2-3, each bearing a solitary ovule. Seeds broadly ovoid or ellipsoid, 7-10 × 5.5-7 mm, obtusely or bluntly crested at apex, slightly ridged dorsally, light brown to brown.

General distribution: Puerto Rico, Lesser Antilles, Trinidad, and Tobago.

Distribution in Puerto Rico: In montane forests and wooded slopes, 500-1065 m. Recorded from Maricao, Río Grande, and San Germán.

Common names: Puerto Rico: *Caoba del país, Caobilla; Podocarp.*

Selected specimens examined: PUERTO RICO: Maricao: *Sargent 509* (US); *Sintenis 291*(US); Río de Maricao, *Britton et al. 2462* (US); Monte Alegrillo, *Britton et al. 2598* (US); Bosque Insular de Maricao, Las Tetas de Cerro Gordo, *Webster et al. 8868* (US); Insular Forest (Monte del Estado), 1 mi. E of stone observation tower, *Stimson 1270* (US); Maricao State Forest: Bo. Cain Alto, *Proctor 47174* (US); Bosque Insular de Maricao, near Buena Vista, *Little 13343* (US); Bosque Insular de Maricao, trail from Vivero de Peces southward, *Little 13363* (US); Maricao State Forest, W side of Rd. 120, km 14.1, at lookout tower, *Proctor & McKenzie 43831* (US). Río Grande: Trail to El Yunque, Luquillo Mts, *Little 21609* (US); Rt. 191, from Luquillo Experimental Forest, El Yunque peak, *Pfeifer & class 2779, 2780* (US); Sierra de Luquillo, El Yunque, *Hartley 13347* (US); El Yunque, *Sargent 13343* (US) Sierra de Luquillo, El Yunque, *Little 13558* (US); Caribbean National Forest, El Yunque, *Axelrod & Lindgren 6438* (US). San Germán: Bo. Minillas, Maricao Forest Reserve, ca. 2 km down disused Rt. 362 (S of Rt. 120), *Axelrod & Potter 9589* (US).

Cultivated Species

Podocarpus macrophyllus var. *maki* Endl., a native of China, has been planted as an ornamental in Puerto Rico, but is not recorded as being naturalized there.

Family 2. **PINACEAE** *Pine Family*

Pinaceae Lindl., Intr. Nat. Syst. Bot., ed. 2: 313. 1836, *nom. conserv.*

by M. T. Strong & P. Acevedo-Rodríguez

Evergreen or deciduous trees or sometimes shrubs, resinous and aromatic, monoecious; roots fibrous to woody. Bark furrowed, plated, scaly, or sometimes smooth; twigs terete, sometimes bearing persistent primary scale-like cataphylls. Leaves (needles) acicular, linear, or oblong, alternate and spirally arranged or fascicled, sessile to short-petiolate, shed singly or in fascicles; resin canals present. Inflorescence composed of separate, unisexual scaly ament- or catkin-like cones (male) and woody cones (female). Male cones solitary or clustered, axillary, ovoid to ellipsoid or cylindric, maturing and shed annually; sporophylls overlapping, bearing 2 abaxial pollen sacs; pollen spherical, 2-winged, less commonly with wings reduced to frill, or not winged. Female cones solitary, grouped, or whorled, erect or pendent, sessile or short-stalked, ovoid to ovoid-ellipsoid or subglobose, maturing and shed in 1-3 seasons or long-persistent; scales spirally arranged, leathery or fleshy when young, relatively thin to strongly thickened and woody at maturity, with 2 inverted, adaxial ovules. Seeds winged or unwinged, two to each scale; aril lacking; cotyledons 2-12 (-18). A family of 10 genera and ca. 200 species confined almost exclusively to the Northern Hemisphere.

TYPE: *Pinus* L.

Reference: Thieret, J.W. 1993. Fam. 3. Pinaceae. Pp. 352-398. *In*: Flora of North America Editorial Committee (eds.), Fl. North Amer., vol. 2.

1. PINUS

Pinus L., Sp. Pl. 1000. 1753.

Evergreen trees or sometimes shrubs. Bark variously furrowed or plated and scaly, exfoliating.

Branches usually in pseudowhorls; shoots dimorphic, long or short; the short ones borne in close spirals from axils of scaly bracts and bearing fascicles of leaves. Leaves solitary and spirally arranged or in fascicles of (1-) 2-5 (-6); blades linear-lanceolate, linear, or scale-like, ± 2- to 3-angled and rounded on abaxial surface, sessile, sheathed at base by persistent or deciduous, scarious basal sheaths; resin canals 2 or more. Male cones in dense, ament-like, mostly ovoid to cylindric-conic spikes, each in the axil of a scale leaf, often numerous and closely clustered around base of current year's growth. Female terminal or subterminal, sessile or stalked, ovoid to oblong-ellipsoid, maturing in 2 (-3) years; cone scales persistent, woody or pliable, apical portion of each scale thickened, with a scar, or extended into a hook, spur, claw, or prickle. Seeds winged or wingless. Approximately 100 species in north temperate and tropical upland regions of North America, Mexico, West Indies, Central America, Europe, Asia, northern Africa, Philippines, and Sumatra.

LECTOTYPE: *Pinus sylvestris* L., designated by Britton, N. Amer. Trees 5. 1908.

Reference: Farjon, A. & B. T. Styles. 1997. *Pinus* (Pinaceae). Fl. Neotrop. Monogr. 75: 1-291.

1. Pinus caribaea Morelet, Rev. Hort. Côte d'Or 1: 107. 1851. Neotype: Cuba. Isla de la Juventud [Isla de Pinos]. *Lückhoff 11608* (PRF), designated by Lückhoff, Ann. Univ. Stellenbosch, Reeks, A, Wis-Naturk. 39(1): 1-153. 1964.

Fig. 58. B

Medium to tall tree, 20-35 (-45) m tall, 50-100 cm in diam. Trunk erect, terete, slender, clear (unbranched) for ²/₃ to ¾ of tree height; bark rough and scaly, breaking into irregular square plates divided by shallow or deep fissures proximally, grey-brown; crown broadly conical, open or irregular. Leaves in fascicles of (2-) 3 (-4), very rarely 5, straight and rigid, slightly twisted, (12-) 15-26 (-30) cm × (1-) 1.3-1.8 mm, margins serrulate, narrowed to an acute-pungent apex; fascicle sheaths 15-20 mm long, papery, with erose-ciliate margins. Male cones clustered at ends of new shoots, cylindrical, often curved at maturity, 20-30 × 5-7 mm, pink or yellow, maturing yellowish or reddish brown. Female cones subterminal, mostly in pairs or whorls of 3-5 (-8), narrowly conic when closed, ovoid to ovoid-conical when open, (4-) 5-12 (-13) × (3-) 4-6 (-7) cm; peduncles curved, 2-2.5 cm long, deciduous; cone scales ca. 120-200, thin, oblong, nearly flat, straight or recurved; umbo dorsal, flat or slightly raised, 3-4 mm wide, up to 3 mm long, with a minute persistent prickle. Seeds obliquely obovoid, obtuse or angular, slightly flattened, 5-7 × 2.5-3.5 mm, light grey-brown with dark spots or dark brown to blackish, the wings obliquely ovate or oblong, 10-20 × 3.8-8 mm, thin, nearly transparent, grey or light brown, very finely and closely blackish striate.

General distribution: Naturally occurring in the Bahamas, Turks-Caicos Islands, western Cuba, Mexico, and Central America.

Distribution in Puerto Rico: Introduced, planted, and naturalized in areas of the central and the Luquillo mountains.

Common names: Puerto Rico: *Pino antillano, Pino hondureño, Caribbean pine tree.*

Cultivated Species

Pinus occidentalis Sw., a native of Hispaniola, has been planted as an ornamental in Puerto Rico, but is not recorded as being naturalized there.

Family 3. **ZAMIACEAE** *Zamia Family*

Zamiaceae Horan., Prim. Lin. Syst. Nat. 45. 1834.

by P. Acevedo-Rodríguez & M. T. Strong

Palm-like plants; stems subterranean to tall and erect, usually unbranched, cylindrical, with persistent

leaf bases (in Australian genera). Leaves simple-pinnate, spirally arranged, interspersed with cataphylls; leaflets sometimes dichotomously divided. Longitudinal ptyxis erect to inflexed or sometimes reflexed, horizontal ptyxis conduplicate. Leaflets with several sub parallel dichotomously branching longitudinal veins, lacking a mid rib; stomata on both surfaces or undersurface only; individual ptyxis flat. Trichomes colored or transparent, branched or unbranched, short-curved or idioblastic. Male and female sporophylls spirally aggregated into determinate axillary cones. Female sporophylls simple, appearing peltate, with a barren stipe and an expanded and thickened lamina with 2 (rarely 3 or more) sessile, orthotropous ovules inserted on the inner (axis facing) surface and directed inwards ("inverted"). Seeds radiospermic. Two subfamilies with nine genera and ca. 150 species in tropical and warm temperate regions of Africa, Australia and North and South America.

TYPE. *Zamia* L.

References: Eckenwalder, J. E., 1980. Taxonomy of the West Indian Cycads. J. Arnold Arbor. 61: 701-722. Jones, D. L. 1993. Cycads of the world. Smithsonian Institution Press, Washington DC. 312 pp. Negrón Ortiz, V. & G. J. Breckon. 1989. A note on the dispersal of *Zamia* (Zamiaceae) in Puerto Rico. Caribbean J. Sci. 25(1-2): 86-87. Newell, S. J., 1983. Reproduction in a natural population of cycads (*Zamia pumila* L.) in Puerto Rico. Bull. Torrey Bot. Club 110 (4): 464-473. Newell, S. J. 1986. Variation in leaf morphology among three populations of *Zamia* L. in Puerto Rico. Taxon 35(2): 234-242. Newell, S. J., 1989. Variation in leaflet morphology among populations of Caribbean Cycads (Zamia). Amer. J. Bot. 76 (10): 1518-1523. The Cycad Pages. 2004. [http://plantnet. rbgsyd.gov.au/PlantNet/cycad/index.html]. Stevenson, D. W., 1987. Again the West Indian Zamias. Fairchild Trop. Gard. Bull. 42(3): 23-27. Stevenson, D. W. (ed.), 1990. The biology, structure, and systematics of the Cycadales. Mem. New York Bot. Gard. 57: 1-210.

1. ZAMIA

Zamia L., Sp. Pl. ed. 2, 1659. 1763.

Terrestrial or very seldom epiphytic, fern-like or palm-like, dioecious woody plants; stems massive, unbranched or branched, tuber-like and wholly or partly subterranean or cylindrical and wholly emergent. Leaves spirally arranged, few to many in a terminal crown, pinnate; leaflets coriaceous, opposite or nearly so, with numerous longitudinal veins but lacking a mid rib, entire, toothed toward the apex, or sometimes spinulose, articulate at base; petioles elongated, swollen at base, usually with spiny prickles; "stipules" paired, inconspicuous. Cones solitary to numerous, with sporophylls in vertical rows, these hexagonal at apex; staminate cones cylindrical, erect or decumbent, with wedge-shaped, short-stalked sporophylls; pistillate cones ovoid or barrel-shaped, erect, with peltate sporophylls that are faceted or flattened at apex. Seeds ovoid or subglobose with orange, red, yellow or brown sarcotesta. A Neotropical genus with 50-60 species (some of which are still undescribed) occurring in a wide range of habitats, many of them cultivated in the tropics as house and garden plants.

There has been much disagreement with respect to the number of *Zamia* species recognized in Puerto Rico and the West Indies. In a detailed study of leaf morphology, based on herbarium specimens, Eckenwalder (1980) found a continuous gradation of foliar characters throughout the West Indies, concluding that *Zamia* was represented in the West Indies by two subspecies of *Z. pumila*. Accordingly, all native populations of *Zamia* in Puerto Rico are *Z. pumila* ssp. *pumila*. A contrasting view is presented by Stevenson (1987) where 4 species are recognized in Puerto Rico based on foliar and strobili characters derived from herbarium specimens and live plants. For the most part (except for the recognition of *Z. integrifolia*), the present authors follow Stevenson's opinion realizing that further work is needed (DNA sequencing) in order to confirm or reject his assessment.

TYPE: *Zamia pumila* L.

Key to the species of *Zamia*
(modified after Stevenson, 1987)

1. Leaflet narrowly lineate, 5-7 mm wide, with entire or seemingly entire margins, the apex long acute; seeds red to blood-red ..... 2. *Z. portoricensis*

1. Leaflet lineate-oblong, oblong or narrowly obovate, 10 or more mm wide, with serrate or callous margins, the apex acute, obtuse, erose or truncate; seeds orange or orange-red. 2
   2. Leaflets oblong, 1-2 cm wide ..... 3. *Z. pumila*
   2. Leaflet oblanceolate to obovate, 1.5-3.5 (-5) cm wide ..... 1. *Z. amblyphyllidia*

1. Zamia amblyphyllidia D.W. Stev., Fairchild Trop. Gard. Bull. 42(3): 26. 1987. Type: Puerto Rico; Utuado (Río Abajo). *Acevedo-Rdgz. 576* (holotype: NY, isotypes: FTG, NY).

Zamia latifoliolata sensu Britton & P. Wilson in part, non Prenleloup, 1872.

Fig. 58. C

Palm-like, acaulescent shrub 0.7-1.2 m tall; stem subterranean, tuberous, 3-10 (-25) cm in diameter, often dichotomously branched, smooth, devoid of old leaf bases. Young leaves rusty pubescent. Leaves arched-ascending, several to numerous, forming a crown; leaflets (2)5-15 pairs, the distal ones opposite, but the basal ones alternate, narrowly oblanceolate to obovate, 12-25 × 1.5-3.5 cm, base decurrent onto the rachis, the apex obtuse, rounded or truncate, often erose or notched apically, the margins remotely and minutely serrate in upper half; petioles smooth. Cataphylls ca. 1.5 cm long, subulate. Staminate cones pedunculate, resembling a corn-cob, 6-20 × 1-3 cm, densely reddish brown pubescent. Ovulate cones 1(3), pedunculate, cylindrical with long, gradually tapering blunt sterile apex, 6-15 × 4-6.5 cm, densely reddish brown or dark brown pubescent. Seeds ovoid-angled, 1-2 cm long, with a orange-red fleshy coat.

General distribution: Known to occur in Jamaica, western Cuba, and Puerto Rico.

Distribution in Puerto Rico: Widely distributed along the northern karst region. Rare to locally common. Recorded for Arecibo, Bayamón, Ciales, Manatí, Toa Alta, Toa Baja, and Utuado.

Common name: Puerto Rico: *Marunguey.*

Selected specimens examined: PUERTO RICO: Arecibo: Cambalache State Forest Reserve, *Strong et al. 463* (US). Bayamón: Bo. Hato Tejas, *Axelrod 7616* (UPRRP). Ciales: ca. 80 m E of coordinates 18 23.593'N, 66 29.29'W, *Acevedo-Rdgz. et al. 13494* (US). Toa Alta: Along Rt. 677, 2 mi. S of Rt. 2, *Miller & Taylor 5917* (UPRRP). Toa Baja: Finca Nevares al lado de Carrt. # 2, *Acevedo-Rdgz. & Chinea 2144* (NY, UPR, US).

2. Zamia portoricensis Urb., Symb. Antill. 1: 291. 1899. Type: Puerto Rico; Guánica. *Sintenis 3782* (holotype: B, isotype: NY-fragment).

Fig. 58. D

Fern-like shrub, 40-90 cm tall; stem subterranean, tuberous, 6-15 cm in diameter, dichotomously branched, wrinkled. Leaves 2-10, ascending-arched; leaflets 5-30 pairs, opposite or subopposite, linear, 8-25 × 0.5-0.8 cm, often canaliculate above, acute at apex, entire; petioles smooth. Staminate cones 1-10, pedunculate, resembling a corn-cob, 3-15 × 0.8-2 cm, densely pubescent. Ovulate cones 1 (-3), short-pedunculate, cylindrical to slightly ovoid with blunt or slightly acute apex , 6-12 × 4-5 cm, dark reddish brown sometimes becoming gray when mature, densely pubescent. Seeds ovoid, 1-2 cm long, with red or blood-red fleshy coat.

General distribution: Endemic to Puerto Rico.

Distribution in Puerto Rico: Known only from SW Puerto Rico. Recorded for Guánica, Sabana Grande, and Yauco.

Common name: Puerto Rico: *Marunguey.*

Selected specimens examined: PUERTO RICO: Guánica: Guánica Forest Reserve, *Axelrod & Escobar 2879* (UPRRP). Sabana Grande: Susúa Forest Reserve, *Axelrod et al. 3821* (UPRRP). Yauco: Susúa Forest Reserve, *Axelrod & Chavez 4044* (UPRRP).

3. Zamia pumila L., Sp. Pl., ed. 2, 1659. 1763. Lectotype: Hispaniola. J. Commelin, *Horti Med. Amstelod. 1: t. 58, 1697*, designated by Eckenwalder, J. Arnold Arbor. 61: 715. 1980.

Zamia debilis L. f. in Aiton, Hort. Kew. 3: 478. 1789. Type: Hispaniola. J. Commelin, *Horti Med. Amstelod. 1: t. 58, 1697.*

Zamia integrifolia L. f. in Aiton, Hort. Kew. 3: 477. 1789. Holotype: United States; Florida, (a plant cultivated at Kew Gardens), *Aiton s.n.* (K).

Zamia media Jacq., Pl. Hort. Schoenbr. 3: 77, t. 397, 398. 1798. Lectotype: West Indies. Jacq., *Hort. Schoenb. 3: t. 398. 1798*, designated by Eckenwalder, J. Arnold Arbor. 61: 715. 1980.

Zamia floridana A. DC., Prodr. 16(2): 544.1868; *Zamia angustifolia var. floridana* (A. DC.) Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 4(4): 315. 1876. Type: United States; Florida. *Hulse s.n.* (holotype: G-DC).

Zamia latifoliolata Prenl., Bull. Soc. Vaud. Sci. Nat. 11: 278. 1872. Type: Dominican Republic. *Prenleloup s.n.* (holotype: LAU).

Zamia allison-armourii Millsp., Publ. Field Columbian Mus., Bot. Ser. 2: 23. 1900. Type: Dominican Republic; Santo Domingo. *Millspaugh 817* (holotype: F-60817, isotype: NY-fragment).

Zamia erosa O.F. Cook & G.N. Collins, Contr. U. S. Natl. Herb. 8: 267. 1903. Type: Puerto Rico; Vega Baja. *Cook s.n.* (lectotype: NY, isolectotype: NY), designated by Eckenwalder, J. Arnold Arbor. 61: 716. 1980.

Fern-like shrub to 1 m tall; stem subterranean, tuberous, 3-10(25) cm in diameter, often dichotomously branched, wrinkled. Leaves 2-15; leaflets 5-30 pairs, opposite or subopposite, oblong, 8-25 × 0.5-2 cm, acute or somewhat rounded at apex, often deeply cleft or erose, with 10-15 distinct teeth in upper fourth; petioles smooth. Cataphylls subulate, to 3.5 cm long. Staminate cones 1-10 (30), pedunculate, resembling a corn-cob, 3-15 × 0.8-2 cm, dark reddish brown. Ovulate cones 1-5, pedunculate, cylindrical to slightly ovoid with blunt or slightly acute apex , 6-12 × 4-6 cm, dark reddish brown sometimes becoming gray when mature, densely pubescent. Seeds ovoid-angled, 1-2 cm long, with an orange-red fleshy coat.

General distribution: Distributed in S.E. United States (Georgia & Florida), Bahamas, central Cuba, Hispaniola, and southern Puerto Rico.

Distribution in Puerto Rico: Known from the municipalities of Aguadilla, Bayamón, Coamo, Dorado, Guayanilla, Isabela, Loíza, Manatí, Ponce, Salinas, Santa Isabel, Toa Alta, Vega Baja, and Yauco.

Common names: Puerto Rico: *Marunguey, Palmita de jardin.*

Note: Zamia integrifolia is here lumped under *Z. pumila* because the putative distinguishing character, i.e., the entire leaflet margins, is not present in its lectotype.

Selected specimens examined: PUERTO RICO: Aguadilla: Rt. 107, km 2.2 (near Rt. 458), *Axelrod & Ackerman 261* (UPRRP). Dorado: Rt. 677, ca. 2 km S of Rt. 2, ca. 1 km N of Hacienda Dorado, *Taylor & Molano 8629, 8630* (UPRRP). Guayanilla: El convento, Quebrada los Cerros, limestone hills, *Galarza et al. 108* (UPRRP). Isabela: Bo. Jauca 2, *Proctor & Colón 50478* (SJ-2). Loíza: Calle Villanueva of Pueblo Indio, *Taylor et al. 9469* (UPRRP). Manatí: Bo. Tierras Nuevas Saliente, *Proctor & Figueroa 50647* (SJ). Salinas: Campamento Santiago, Bo. Río Jueyes, *Proctor 50391* (SJ).

CULTIVATED FAMILIES

A number of species of the gymnosperm families Araucariaceae and Cupressaceae are planted as ornamentals in Puerto Rico and the Virgin Islands. In the Araucariaceae, these include: *Agathis robusta* (F.J. Müll.) F.M. Bailey (native to Australia), *Araucaria angustifolia* (Bertol.) Kuntze (native to Brazil), *A. bidwillii* Hook. (native to Australia), and *A. heterophylla* (Salisb.) Franco (native to the Norfolk Islands). In the Cupressaceae, these include: *Chamaecyparis funebris* (Endl.) Franco (native to China), *Cupressus arizonica* Greene (native to Arizona, U.S.A.), *C. lusitanica* Mill. (native to Mexico and Central America), *C. macrocarpa* Hartw. (native to California, U.S.A.), *C. sempervirens* L. (native to southern Europe), and *Thuja orientalis* L. (native to China and Korea).

MONOCOTYLEDONS

Key to the families

1. Plants of aquatic or marine environments 2
   2. Plants submersed, floating, or emersed in fresh to brackish waters 3
      3. Plants plate-like, tiny, 1-2.5 mm long ..... *Lemnaceae*
      3. Plants not plate-like, leaves well-developed with blades well over 1 cm long 4
         4. Inflorescence sessile or essentially so, 1-flowered 5
            5. Plant a floating rosette of leaves, acaulescent; inflorescence included within a spathe ..... *Araceae* (*Pistia*)
            5. Plant submersed and rooting with elongate often branching stems; inflorescence axillary, not included within a spathe ..... *Hydrocharitaceae* (*Najas*)
         4. Inflorescence pedunculate, 1- to many-flowered, not included within a spathe, or may be included within a spathe-like bract when immature 6
            6. Perianth present, white, blue, lilac, or rarely yellow 7
               7. Leaves submersed, strap-like or ribbon-like ..... *Hydrocharitaceae*
               7. Leaves emersed or floating on surface (at least some) with petioles and dialated linear, lanceolate, ovate, elliptic, orbicular, or sagittate blades 8
                  8. Leaf blades floating on surface or ascending slightly above it, orbicular or broadly elliptic 9
                     9. Flowers unisexual, inconspicuous; ovary inferior; fruit a many-seeded berry ..... *Hydrocharitaceae* (*Limnobium*)
                     9. Flowers bisexual, showy; ovary superior; fruit of distinct follicles ..... *Limnocharitaceae* (*Hydrocleys*)
                  8. Leaf blades emersed, generally erect, linear, lanceolate, ovate, elliptic, or sagittate 10
                     10. Fruit a many-seeded capsule ..... *Pontederiaceae*
                     10. Fruit an achene ..... *Alismataceae*
            6. Perianth absent 11
               11. Inflorescence a spike of 2-many flowers; stipes of fruits (druplets) not elongating ..... *Potamogetonaceae*
               11. Inflorescence a cluster of 2 or rarely more flowers; stipes of fruits (druplets) elongating ..... *Ruppiaceae*
   2. Plants submersed in marine or brackish environment 12
      12. Leaves strap-like, 4-12 mm wide ..... *Hydrocharitaceae*
      12. Leaves linear or cylindrical, to 2 mm wide 13
         13. Leaves linear, with a conspicuous midvein, narrowly acuminate at apex .. *Ruppiaceae*
         13. Leaves cylindrical, without midvein, truncate to concave at the expanded apex (in ours) ..... *Cymodoceaceae*

1. Plants terrestrial, epiphytic, or of marshy environments 14
   14. Plants woody, with a single trunk and an unbranched crown of large (> 75 cm long) leaves ..... *Arecaceae*
   14. Plants herbaceous or woody; stem short and covered by a basal rosette of leaves, or the stem elongate and often branched, with leaves scattered along the stem 15
      15. Plant with a definite woody stem 16
         16. Trunks with prop roots at base; flowers in heads or spadices ..... [*Pandanaceae*]
         16. Trunks without prop roots at base; flowers in branching inflorescences 17
            17. Inflorescence an axillary raceme or panicle; fruit a fleshy berry or sometimes hard and woody, usually red or orange; seeds globose or elongate ..... *Dracaenaceae*

17. Inflorescence a large terminal panicle; fruit a fleshy or chartaceous capsule; seeds compressed ..... *Agavaceae* (*Yucca*)
15. Plant herbaceous, or if woody, the stem very short and leaves in a rosette 18
18. Plants climbing (vines) 19
19. Plants with bisexual flowers 20
20. Leaves reduced and scale-like; branches transformed into verticillate or fasciculate needle-shaped cladodes ..... *Asparagaceae*
20. Leaves well-developed; branches not forming cladodes ..... *Araceae* (in part)
19. Plants with unisexual flowers 21
21. Plant monoecious, climbing aided by adventitious roots; leaves with a stout midvein and secondary pinnate veins; inflorescence a spadix, subtended by a spathe ..... *Araceae* (in part)
21. Plants dioecious, twining, or climbing by tendrils; leaves with 3-9 arcuate mid veins; inflorescence spike-like, racemose, paniculate or umbellate, not subtended by a bract 22
22. Plants with stipular tendrils; inflorescence umbellate; fruit a berry .....*Smilacaceae*
22. Plants twining, without tendrils; inflorescence a spike, raceme or panicle; fruit a chartaceous samara or a 3-winged capsule. .....*Dioscoreaceae*
18. Plants erect, prostrate or decumbent, not climbing 23
23. Inflorescence a spadix subtended by a spathaceous bract. ..... *Araceae*
23. Inflorescence a spike, a cyme, a raceme or a panicle not subtended by a spathaceous bract 24
24. Flowers inconspicuous, perianth scale-like or reduced to bristles or scales 25
25. Flowers subtended by 3-6, whorled, scale-like perianth segments (tepals); fruit a 3- to many-seeded capsule ..... *Juncaceae*
25. Flowers subtended by a single or pair of scale-like bracts; fruit a one-seeded achene-like follicle, achene, or utricle 26
26. Flowers unisexual, densely arranged in separate, large cylindrical spikes on the same stalk; fruit a one-seeded achene-like follicle, subtended by whorls of fine perigonal hairs ..... *Typhaceae*
26. Flowers bisexual or sometimes unisexual, arranged in small, compressed or terete, spikes or spikelets in branching or head-like inflorescences; fruit an achene or utricle, naked or subtended by hypogynous barbed bristles 27
27. Flowers spirally imbricate or less often 2-ranked, subtended by a single scale; leaf-sheath usually closed; stems triangular or cylindrical; fruit an achene with or without bristles ..... *Cyperaceae*
27. Flowers distichously arranged, subtended by a pair of scales; leaf-sheath usually open; stems cylindrical; fruit an utricle without bristles ..... *Poaceae* (forthcoming volume)
24. Flowers showy, either the sepals or the petals large, not scale-like nor reduced to bristles or scales 28
28. Ovary superior 29
29. Leaves in a rosette or rosulate at base 30
30. Leaves chartaceous to rigid-coriaceous ..... *Bromeliaceae*
30. Leaves fleshy, thickened 31
31. Leaves 30-60 cm long, with a gelatinous core, not fibrous; scapes to 1 m tall ..... *Asphodelaceae*
31. Leaves 90-275 cm long, with a fibrous core; scapes 5-7 m tall. ..... *Agavaceae* (*Agave, Furcraea*)
29. Leaves alternate, opposite or spirally arranged 32

32. Leaves reduced and scale-like; branches transformed into verticillate or fasciculate needle-shaped cladodes ..... *Asparagaceae*
32. Leaves well-developed; branches not forming cladodes 33
33. Flowers subtended by indurate scales, imbricately arranged in a solitary, ovoid or ellipsoid, cone-like spike at the apex of a naked culm ..... *Xyridaceae*
33. Flowers not subtended by scales, arranged in cymes, racemes or panicles 34
34. Inflorescence cymose, usually enclosed by a folded, boat-shaped, spathe-like bract; flower with distinct calyx and corolla, free or basally connate ..... *Commelinaceae*
34. Inflorescence racemose or paniculate, not enclosed by a boat-shaped bract; flower perianth tubular or funnel-shaped ..... *Dracaenaceae*
28. Ovary inferior 35
35. Leaf veining pinnate, secondary veins arising along the primary mid rib from base to apex, these parallel 36
36. Fertile stamens 5(6) 37
37. Leaves and bracts spirally arranged; flowers unisexual; inflorescences with chartaceous, wine-colored bracts ..... *Musaceae*
37. Leaves and bracts distichously arranged; flowers bisexual; inflorescences with fleshy, showy, colorful bracts ..... *Heliconiaceae*
36. Fertile stamen 1 38
38. Leaves eligulate; ovary or fruit warty ..... *Cannaceae*
38. Leaves with a pair of stipule-like ligules; ovary or fruit smooth 39
39. Leaves with a swollen pulvinus or joint at the junction of the petiole and blade ..... *Marantaceae*
39. Leaves lacking a swollen pulvinus or joint at the junction of the petiole and blade 40
40. Leaves distichously arranged; sheaths open; ovary with 2 apical nectary glands ..... *Zingiberaceae*
40. Leaves spirally arranged; sheaths closed; ovary without apical glands ..... *Costaceae*
35. Leaf veining parallel, secondary veins arising from the base of the primary mid rib 41
41. Flowers zygomorphic; anthers usually 1, sessile near the apex of a column; plants commonly epiphytic, less often lithophytic or terrestrial ..... *Orchidaceae* (see Ackerman 1995)
41. Flowers actinomorphic or nearly so; stamens 3 or 6, with long, distinct or basally connate filaments; plants terrestrial 42
42. Perianth conspicuously pubescent ..... *Haemodoraceae*
42. Perianth not conspicuously pubescent 43
43. Stamens 3 44
44. Leaves reduced, scale-like; plant saprophytic (not green and photosynthetic) ..... *Burmanniaceae*
44. Leaves well-developed; plant not saprophytic ..... *Iridaceae*
43. Stamens 6 45
45. Leaves swollen at base into a bulb; perianth segments > 6.5 cm long; fruit a capsule; seeds glabrous ..... *Amaryllidaceae*
45. Leaves not swollen at base; perianth segments to 1.5 cm long; fruit a berry; seeds pilose ..... *Hypoxidaceae*

Family 1. **ARACEAE** *Philodendron Family*

Araceae Juss., Gen. Pl. 23. 1789, *nom. conserv.*

by P. Acevedo-Rodríguez & D. H. Nicolson

Erect perennial herbs, often with creeping or tuberous rhizomes, or climbing robust herbs with adventitious roots. Leaves alternate, heterophyllous in numerous genera, often all basal, stout, simple, compound, dissected or lobed; petioles forming a sheath at base. Flowers minute, bisexual or unisexual (monoecious), in a terminal, densely-flowered spadix with a large, subtending bract (spathe) of variable size and shape; perianth of 4 or 6 distinct or connate tepals in two cycles, or these reduced or wanting; stamens (1-) 4 or 6 (8), the filaments mostly short, distinct or connate, the anthers opening by terminal pores or longitudinal slits; ovary superior, often unilocular with basal to lateral parietal placentation, or less often with several locules of (2) 3 (-15) united carpels with axile placentation, the ovules few or solitary or less often numerous, the style terminal and short or the stigma sessile. Fruit a berry or developing with the spadix and maturing as a multiple fruit. A family of about 110 genera and ca. 2, 450 species, most with tropical and subtropical distribution.

TYPE: *Arum* L.

References: Engl., A. & K. Krause, 1920. Araceae-Colocasioideae. *In:* A. Engler (ed.) Das Pflanzenreich IV. 23E (Heft 71). Leipzig. Govaerts, R. & D. Frodin. 2002. World Checklist and Bibliography of Araceae. Royal Botanic Garden, Kew. Howard, R. A. 1979. Nomenclatural notes on the Araceae of the Lesser Antilles. J. Arnold Arbor. 60: 272-289. Mayo, S. J., J. Bogner, and P. C. Boyce, 1997. The Genera of Araceae. Royal Botanic Garden, Kew. Nicolson, D. H. 1987. Araceae. Pp. 17-101. *In:* Dassanayake, M. D. & F. R. Fosberg (eds.). A Revised handbook to the Flora of Ceylon. Vol. 6. Smithsonian Institution, Washington, DC.

Key to the genera

1. Plants floating, aquatic; leaves subsessile, in a dense rosette .....11 *Pistia*
1. Plants terrestrial, epiphytic or of marshy environments but not floating; leaves petiolate, alternate or in a loose rosette 2
   2. Plants erect, not climbing 3
      3. Stems aerial, erect, non-rhizomatous (non-starchy) 4
         4. Leaf blades lanceolate or triangular-lanceolate, cordate at base; petioles to 1 m long ....10 *Philodendron giganteum*
         4. Leaf blades elliptic, ovate or nearly lanceolate, the base acute, obtuse, truncate or seldom subcordate; petioles 30-40 cm long 5
            5. Spathe ovate, not differentiated into a tube and blade, free from the spadix; stamens solitary, free ..... [*Aglaonema*]
            5. Spathe convolute, surrounding the spadix, slightly constricted at the middle and basally adnate to the pistillate portion of the spadix; stamens 4-5, connate into a synandrium .... 5 *Dieffenbachia*
      3. Stems subterranean and modified into tubers or rhizomes, or aerial but massive, and starchy 6
         6. Leaves solitary or less often 2 or 3; blades trisect; petioles with banded variegation .... 6 *Dracontium*
         6. Leaves in a loose rosette; blades entire; petioles not band-variegated 7
            7. Flowers bisexual and with obvious perianth 8
               8. Tertiary veins reticulate; spathe green, reflexed (red, orange, white, erect or spreading in cultivated species) ..... 2 *Anthurium*
               8. Tertiary veins parallel-pinnate; spathe white, erect ..... 12 *Spathiphyllum*
            7. Flowers unisexual, lacking perianth 9
               9. Leaves peltate at base 10

10. Leaf blades usually variegated with small white, pink, or reddish, spots; spadix lacking a distal appendage ..... *3 Caladium*
10. Leaf blades green; spadix usually with a distal sterile appendage ..... 4 *Colocasia*
9. Leaves sagittate or cordate at base 11
11. Spadix with a sterile distal appendage ..... 1 *Alocasia*
11. Spadix with distal fertile portion (without a sterile appendage) 12
12. Spathe strongly constricted, the lower part forming a tube with convolute margins, the upper part a concave, evanescent blade ..... 14 *Xanthosoma*
12. Spathe not constricted, sub-cylindrical or obconic, persistent ..... [*Zantedeschia*]
2. Plants climbing herbs or vines aided by adventitious roots 13
13. Flowers bisexual 14
14. Perianth present; spathe chartaceous and reflexed, not covering the spadix; stems to 5 mm in diam.; leaves 7-13 cm long, simple, green, not-perforated ..... 2 *Anthurium*
14. Perianth absent; spathe fleshy, erect, covering (surrounding) the spadix; stems to 2 cm in diam.; leaves 20-50 cm long, pinnately compound or simple, simple leaves variegated or perforated 15
15. Leaves pinnately divided, or if simple green or variegated (green and yellow) and non-perforated; ovary unilocular; seeds reniform ..... 7 *Epipremnum*
15. Leaves simple, perforated; ovary bilocular; seeds ovoid or cylindrical ..... 18 *Monstera*
13. Flowers unisexual 16
16. Leaves pedately dissected; sap milky ..... 13 *Syngonium*
16. Leaves entire, cordate, elliptic or pinnately compound; sap clear ..... 10 *Philodendron (in part)*

1. ALOCASIA

Alocasia (Schott) G. Don in Sweet, Hort. Brit., ed. 3, 631. 1839, *nom. conserv.*

Erect, medium-sized to rarely arborescent herbs, terrestrial; stems thick, with clear or milky sap, often subterranean, stoloniferous or bulbiferous, aerial portion erect. Leaves alternate, few to many in a terminal crown, simple, sinuate to deeply pinnatifid, sagittate, or less often hastate or cordate, sometimes peltate at base, long-petiolate, sometimes subtended by a cataphyll. Inflorescence 2-many per node. Spathe usually herbaceous, partially enclosing the spadix, strongly constricted, forming a tube with convolute margins, shorter than the erect, boat-shaped blade; spadix sessile or short-stipitate, shorter than the spathe, with a sterile distal portion (appendage), a pistillate conical-cylindrical basal zone, separated from the staminate zone by a narrower zone of sterile flowers, and a staminate cylindrical or conical zone. Flowers unisexual, lacking perianth; stamens 3-12(36), connate into a synandrium; ovary 1-locular or partially 3- or 4-locular at apex, with 6-10 basal ovules per locule, the style short, the stigma depressed-capitate, 3- or 4-lobed. Fruit fleshy, usually bright red, with 1-5 seeds. A genus of 60-70 species native to the Old World tropics and subtropics, with 3 species cultivated and naturalized in the Neotropics.

TYPE: *Alocasia cucullata* (Lour.) G. Don (≡ *Arum cucullatum* Lour.), *typ. conserv.*

References: Bunting, G. S. & D. H. Nicolson. 1963. The *Alocasia plumbea* confusion. Baileya 11: 142-146. Hay, A., 1998. The genus *Alocasia* (Araceae-Colocasieae) in West Malaysia and Sulawesi. Gard. Bull. Straits Settlem. 50: 221-334.

Key to the species of *Alocasia*

1. Leaf blades green, coriaceous; petioles green; plant not flowering or fruiting in Puerto Rico ..... 1. *A. macrorrhizos*

1. Leaf blades purplish tinged at least abaxially, chartaceous; petioles purplish variegated to completely burgundy or dark purple; inflorescence paired; spathe blade reflexed at anthesis, chartaceous, adaxially pinkish ..... 2. *A. plumbea*

1. Alocasia macrorrhizos (L.) G. Don in Sweet, Hort. Brit. ed. 3, 631. 1839 [as "*macrorrhizon*"]; *Arum macrorrhizon* L., Sp. Pl. 965. 1753. Lectotype: Sri Lanka. Hermann, *Parad. Bat. t. 73. 1698,* designated by Furtado, Gard. Bull. Straits Settlem. 11: 252. 1941 (see Nicolson, Rev. Fl. Ceylon 6: 58. 1987, for discussion).

Fig. 58. E

Glabrous, terrestrial herb, 1-1.5 m tall, producing watery sap; acaulescent or developing an elongated caudex with age; acaulescent plants with a short, conical corm. Leaves in a rosette, ascending; blades flattened, ascending, with basal sinus projecting downward, 25-50 (-100) × 20-36 (-100) cm, green (although white-variegated in some cultivars), slightly lustrous, lance-ovate, coriaceous, wavy or slightly plicate along secondary veins, the apex acute or obtuse and apiculate, the base hastate, the sinuses non-overlapping, to 30 cm long, the margins wavy, with a submarginal vein within 2 mm from margin; midvein and secondaries stout, prominent on both surfaces, lower surface with dark spots on secondary vein angles; petioles 60-100 cm long, invaginate on lower ½, upper margins of invagination revolute. Not known to flower or fruit in Puerto Rico.

General distribution: Native to India through SE Asia and Malesia. Introduced and escaped throughout the tropics as an ornamental and as a source of food.

Distribution in Puerto Rico: Common herb of moist secondary forests, abandoned farms, along stream and river banks. Recorded for Arecibo, Bayamón, Gurabo, Loíza, Naguabo, and San Sebastián.

Common name: Puerto Rico: *Yautía cimarrona.*

Selected specimens examined: PUERTO RICO: Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10755* (UPRRP, US). Bayamón: Bo. Santa Olaya, Quebrada Collores, *Proctor 43188* (SJ). Gurabo: Bo. Mamey: Road 189, km 10.4, *Proctor 45122* (SJ). Loiza: Vacia Talega, disturbed area of sand, *Axelrod & Thomas 12688* (UPRRP). Naguabo: Bo. Río Blanco: near Road 191 ca. 200 m from jct w/Road 31, *Proctor 45127* (SJ). San Sebastián: *Sargent 280* (US).

2. Alocasia plumbea Van Houtte, Fl. Serres Jard. Eur. 21: 93. 1875. Lectotype: Java (?). Van Houtte, *Fl. Serres Jard. Eur. 21: t. 2206.* 1875, here designated.

Fig. 58. F

Glabrous, acaulescent, terrestrial herb, ca. 1 m tall, with a short starchy corm or rhizome at base. Leaves in a basal rosette; blades more or less flattened, ascending or less often pointing downward, 40-60 × 20-35 cm, slightly lustrous, adaxially green, abaxially purplish or pinkish tinged, elliptic-lanceolate, chartaceous, wavy or slightly plicate along secondary veins, with a submarginal vein within 3 mm from margin, the apex obtuse or acute, apiculate, the base sagittate, symmetrical, the sinuses nearly touching each other, ca. 20 cm long; midvein and secondaries stout, whitish, prominent on lower surface, lower surface with dark spots on secondary vein angles; petioles to 1 m long, green, variegated with purple or completely purple, ascending or slightly arched, invaginate on lower ½. Inflorescences axillary, two per leaf, ascending; peduncles to 25-30 cm long, cylindrical, green, tinged with purple or pinkish; spathe chartaceous, the tube green, ca. 4 cm long, the blade oblong-elliptic, reflexed at anthesis and soon withering, 20-21 cm long, abaxially green with purplish tinge, pinkish adaxially; spadix cream, the distal sterile zone 12-14 cm long.

General distribution: Native to SE Asia, introduced in Puerto Rico as an ornamental, now naturalized.

Distribution in Puerto Rico: Occasional, cultivated and escaped or naturalized in moist disturbed habitats, such as roadsides. Recorded for Adjuntas, Arecibo, Luquillo, and Toa Baja.

Common name: Puerto Rico: *Yautía ornamental.*

Note: Although recent workers (Hay, 1998;

Govaerts & Frodin, 2002) suggest *Alocasia plumbea* to be a cultivar of the variable species *A. macrorrhizos*, we are treating it as a distinctive species because the populations of both taxa as found in Puerto Rico and other parts of the Neotropics are quite distinctive from each other (refer to key above).

Selected specimens examined: PUERTO RICO: Adjuntas: Bo. Limaní, *Acevedo-Rdgz. et al. 13377* (MAPR, US). Luquillo: Luquillo Mountains, Caribbean National Forest, *Acevedo-Rdgz. 10808* (UPRRP, US). Toa Baja: Bo. Media Luna, 1.7 km due E of Campanilla, *Proctor & González 50496* (SJ-2).

2. ANTHURIUM

Anthurium Schott, Wiener Z. Kunst 1829: 828. 1829.

Erect herbs or vines climbing by adventitious roots, terrestrial or epiphytic; stems elongate, fleshy or the plant acaulescent. Leaves alternate, simple, or palmately lobed, long-petiolate, enveloped by a cataphyll in early stages. Inflorescence solitary. Spathe usually herbaceous, not enclosing the spadix, reflexed, usually long-lived, green, whitish to brightly colored; spadix sessile or short-stipitate, cylindrical or conical, many-flowered, flowering from base to apex. Flowers bisexual, sessile; perianth segments 4; stamens 4; ovary 2-locular, with 1 or 2 pendulous ovules per locule, the style short or wanting, the stigma disk-like to 4-lobed. Fruit a 2-locular, fleshy, bright red, white or lavender berry, often pendulous from a threadlike structure when ready for dispersal; seeds oblong. The largest genus in the family with ca. 800 species native to the Neotropics.

LECTOTYPE: *Anthurium acaule* (Jacq.) Schott (≡ *Pothos acaulis* Jacq.), designated by Britton & P. Wilson, Bot. Porto Rico 5: 128. 1923.

References: Croat, T. B. 1991. A revision of *Anthurium* section *Pachyneurium* (Araceae). Ann. Missouri Bot. Gard. 78: 539-855. Mayo, S. J. 1982. *Anthurium acaule* (Jacq.) Schott (Araceae) and the West Indian 'bird's nest' Anthuriums. Kew Bull. 36: 691-719. Sheffer, R. C. et al. 1980. Taxonomy of *Anthurium scandens* (Araceae). Aroideana 3: 86-93.

Key to the species of *Anthurium*

1. Plant an epiphytic vine with slender, scandent stems, 1-2 m long; leaves alternate, to 13 cm long ..... 4. *A. scandens*
1. Plant terrestrial or epiphytic but not climbing, acaulescent or stems 10-50 cm long; leaves in a rosette, 20-80 cm long 2
   2. Leaves attenuate at base; petioles much shorter than the blade ..... 2. *A. crenatum*
   2. Leaves cordate or truncate at base; petioles as long or nearly as long as the blade 3
      3. Leaves ovate to triangular-ovate, the blades directed downward from the point of attachment at base ..... 1. *A. cordatum*
      3. Leaves lanceolate or elliptic, the blades ascending 4
         4. Blades 30-70 cm long; petioles 30-50 cm long; inflorescence sterile, the peduncle 60-103 cm long; spathe 10-15 cm long, attenuate at apex, spadix 15-40 cm long ..... 5. *A.* × *selloum*
         4. Blades 20-40 cm long; petioles 16-35 cm long; inflorescence fertile, the peduncle 7-28 cm long; spathe 2.5-4.5 cm long, caudate at apex; spadix 2.2-4.6 (11) cm long ..... 3. *A. dominicense*

1. Anthurium cordatum (L.) Schott, Wiener Z. Kunst 1829: 828. 1829; *Pothos cordatus* [as *"cordata"*] L., Sp. Pl. ed. 2, 1373. 1763. Lectotype: Martinique (?), Plumier (Burman ed.), *Pl. Amer., t. 38. 1756*, designated by R.A. Howard, Fl. Lesser Antill. 3: 376. 1979.

Anthurium cordifolium sensu Eggers, Fl. St. Croix 98. 1879; Millspaugh, Publ. Field Columbian Mus., Bot. Ser. 1: 477. 1902, and Little et al., Fl. Virgin Gorda 16. 1976, non Kunth, 1841.

Fig. 2. A-G.

Glabrous, erect, terrestrial herb 0.5-1.5 m tall; stem erect or decumbent, cylindrical, 10-50 (75) cm long and ca. 5 cm diam., with numerous, large leaf scars; cataphylls 10-20 cm long, weathering into persistent fibers. Leaves spirally arranged in a loose rosette; blades directed downward, 30-52 × 25-30 cm, broadly ovate to triangular-ovate, coriaceous, strongly reticulate-veined, the apex obtuse, the base cordate-sagittate with overlapping sinuses, the margins entire, slightly wavy; petioles erect, cylindrical, 20-60 cm long. Inflorescence ascending; peduncles to 50 cm long; spathe reflexed, green, leafy, oblong to ligulate, to 10 cm long; spadix ascending, pendulous when fruits are mature, 10-30 cm long, dark brown, widened at base. Berry bright red, obovoid, 5-8 mm long, produced on proximal portion of spadix, embedded in the axis when immature, pendulous from a thread-like structure when ripe.

General distribution: Jamaica, Virgin Islands and Lesser Antilles.

Distribution in the Virgin Islands: Locally common understory herb of shaded moist forests. St. Croix, St. John, St. Thomas, Tortola, and Virgin Gorda.

Common name: St. John: *Maroon jancole*.

Selected specimens examined: St. Croix: Mt. Eagle, *Thompson 457* (US). N slope Bodkin Hill, *Fosberg & Ogden 55352* (US). E slopes of Mt. Eagle; ca. 1.7 km S of Canebay, *Croat 61021* (US). Maroon Ridge area NE of Springgarden, *Proctor 44985* (SJ, US). St. John: Lamesur, *N.L. Britton & Shafer 516* (US). Cinnamon Bay on road to Herman Farm, *Mori & Woodbury 16998* (NY-2). Tortola: Sage Mt. Natl. Park, *Proctor 50569, 50570* (SJ). Pickate Ghut, W of Mt. Sage, *Proctor & Barwick 41983, 41984* (SJ). High Bush, *N.L. Britton & Shafer 813* (US). Virgin Gorda: Gorda Peak Natl. Park, *Proctor & Barwick 41959* (SJ).

2. Anthurium crenatum (L.) Kunth, Enum. Pl. 3: 75. 1841; *Pothos crenatus* [as "*crenata*"] L., Sp. Pl. ed. 2, 1373. 1763. Lectotype: St. Thomas, U. S. Virgin Is., Plumier (Burman ed.), *Pl. Amer. t. 39. 1756*, designated by Croat, Ann. Missouri Bot. Gard. 78: 635. 1991.

Anthurium acaule sensu many West Indian authors, non (Jacq.) Schott, 1832.

Anthurium huegellii sensu Eggers, Fl. St. Croix 98. 1879, Bello, Anales. Soc. Esp. Esp. Hist. Nat. 12: 115. 1883, and Millspaugh, Publ. Field Columbian Mus., Bot. Ser. I: 477. 1902, non Schott, 1855.

Anthurium lanceolatum Kunth ex Bello, Anales Soc. Esp. Hist. Nat. 12: 115. 1883, *nom. nud.*

Anthurium acaule var. *portoricense* Kuntze, Revis. Gen. Pl. 2: 738. 1891. Type: Puerto Rico. *Kuntze, s. n.* (holotype: NY-2 sheets!; isotypes: K, MO).

Anthurium acaule var. *brevipes* Engl., Bot. Jahrb. Syst. 25: 362. 1898. Type: Puerto Rico. *Sintenis 1582* (isotype: K).

Fig. 58. G; 59. A

Glabrous, erect terrestrial or epiphytic herb 0.8-1.5 m tall; stem prostrate, ca. 10 cm long, with numerous adventitious roots, and numerous persistent cataphylls. Leaves ascending, spirally arranged in a loose rosette; blades 40-80 × 15-25 cm, elliptic, oblong-elliptic or oblanceolate, coriaceous, strongly reticulate-veined, very often weathering into a network of veins, the apex obtuse, with a short apiculum, the base obtuse or rounded, tapering from below the middle of the blade, the margins entire to slightly crenate; petioles 5-20 cm long, flattened along the ventral surface, swollen at point of attachment with blade. Inflorescence ascending; peduncles to 80 cm long; spathe to 12 cm long, reflexed, green, leafy, lanceolate, deciduous; spadix ascending, pendulous when fruits are mature, 10-30 cm long, dark brown, widened at base. Berry bright red, obovate, 5-6 mm long, produced on proximal portion of spadix, embedded in the axis when immature, pendulous from a thread-like structure when ready for dispersal.

General distribution: Hispaniola, Puerto Rico, and the Virgin Islands.

Distribution in Puerto Rico and the Virgin Islands: Common understory herb of shaded moist forests, and scrub forests. Recorded for Arecibo, Barranquitas, Bayamón, Cabo Rojo, Camuy, Cayey, Culebra, Juana Díaz, Luquillo, Maricao, Mayagüez, Peñuelas, Río Grande, Salinas, San Juan, Toa Baja, Yabucoa, Yauco, and Vieques; St. Croix, St. John, St. Thomas and Tortola.

Common names: Puerto Rico: *Flor de Culebra, Hoja de costado, Moco de pavo*; St. John: *Scrub-bush*.

Selected specimens examined: Puerto Rico: Arecibo: Cambalache State Forest: Bo. Garrochales, *Proctor 42413* (SJ); Río Abajo State

Forest: Bo. Río Arriba, *Proctor et al. 49978* (SJ). Barranquitas: Bo. Barrancas, upper NE slope & summit of Monte La Torrecilla, *Proctor & Thomas 44444* (SJ). Bayamón: *Stevenson 384* (US); Bo. Hato Tejas, *Webster & Miller 8607* (US). Cabo Rojo: Sierra Bermeja: Bo. Llanos Costa, upper slopes & summit of Cerro Mariquita, *Proctor & McKenzie 44031* (SJ). Camuy: Montañas Guarionex, Bo. Puertos, top of Mogote 0.45 km due SSE of intersection of Roads 119 & 456, *Proctor et al. 48920* (SJ). Culebra: Bo. Flamenco, on peak 0.6 km due S of Playa Resaca, *Proctor 39985* (SJ). Culebra: *Britton & Wheeler 114* (US). Juana Díaz: Bo. Guayabal, upper S side & summit of Cerro de las Cuevas, *Proctor & Pinto 40788* (SJ). Maricao: Bo. Maricao Afuera. Río Maricao margins, *Cedeño, & Jiménez 550* (SJ). Mayagüez: Vicinity of Mayagüez, NE of Ponce, *Heller 6283* (US). Peñuelas: Bo. Rucio, upper slopes of Cerrote de Peñuelas, *Proctor & Haneke 43267* (SJ, US). Río Grande: Bo. Zarzal: 0.9 km due NNW of Cerro Bravo, *Proctor 42672* (SJ). Salinas: Bo. Lapa, summit of E peak, Las Tetas de Cayey, *Proctor 44406* (SJ). San Juan: Stone Quarry, 2 mi. E of Santurce, *Heller & Heller 1267* (US). Toa Baja: Bo. Candelaria, wooded mogotes 0.4-0.7 km WSW of Pico Nevárez, *Proctor & Carrasquillo 45306* (SJ). Vieques: Isabel Segunda to Campo Cielo, *Shafer 2377* (US). Yabucoa: Bo. Calabazas, hwy 3, app. Km 101.5, *Proctor & Rivera 46942* (SJ). Yauco: Bo. Sierra Alta, summit area of Pico Rodadero, *Proctor & Díaz 44738* (SJ). St. John: Bethania to Rosenberg, *N.L. Britton & Shafer 225* (US). Bordeaux, *N.L. Britton & Shafer 545* (US). Cinnamon Bay on road to Herman Farm, *Mori & Woodbury 16999* (NY). St. Thomas: *Eggers 191* (US). Pearl to Bonne Resolution, *Britton & Marble 1320* (US). *Raunkiaer s.n.* (US). Tortola: Pickate Ghut, W of Mt. Sage, *Proctor & Barwick 41989* (SJ), *N.L. Britton & Shafer 811* (US).

3. Anthurium dominicense Schott, Oesterr. Bot. Z. 8: 350. 1858. Type: Dominica. *Imray s. n.* (K), according to R.A. Howard, Fl. Lesser Antill. 3: 377. 1979.

Anthurium dominicense var. *sintenisii* Engl., Bot. Jahrb. Syst. 25: 418. 1898. Type: Puerto Rico. *Sintenis 4206* (syntype: F), *Sintenis 1581* (syntypes: NY!, US!).

Glabrous, erect terrestrial or epiphytic herb, 50-75 cm tall; stem erect, 3-5(10) cm long, with persistent cataphylls, these subulate, 5-9 cm long, weathering into persistent fibers. Leaves ascending, spirally arranged in a loose rosette; blades 15-(35)50 × 3-14(18.5) cm, lanceolate or oblong-lanceolate, coriaceous, strongly reticulate-veined, the apex acute, with a short apiculum, the base subcordate, truncate or less often rounded, the margins entire to slightly crenate; petioles 20-41 cm long, furrowed along the ventral surface, darker at point of attachment with blade. Inflorescence ascending; peduncles 7-28 cm long; spathe 2.5-4.5 cm long, reflexed, green, leafy, lanceolate, caudate at apex; spadix ascending, 2.2-4.6(11) cm long, green, subcylindrical or widened at base. Berry bright red, ellipsoid to subglobose, 5-6 mm long, produced on spadix for most of its length.

General distribution: Puerto Rico and the Lesser Antilles.

Distribution in Puerto Rico: Occasional understory herb or epiphyte of moist forests. Adjuntas, Canóvanas, Ciales, Luquillo, Maricao, Naguabo, Patillas, Peñuelas, Ponce, and Río Grande.

Common name: Puerto Rico: *Lengua de vaca.*

Selected specimens examined: Puerto Rico: Adjuntas: Alto de la Bandera, *N.L. Britton & Shafer 2013* (US). Canóvanas: Sierra de Luquillo, Caribbean Natl. Forest. W end of El Toro trail, first 1.5 km from road 186, *Proctor & Taylor 46300* (SJ). Ciales: Toro Negro State Forest, upper SE slopes & summit of Cerro Rosa, *Proctor et al. 44594* (SJ). Luquillo: Caribbean Natl. Forest, *Proctor 44751*(SJ, US). Maricao: Maricao State Forest, NE ridge of Monte Allegrillo, *Proctor & Padrón 41665* (SJ). Naguabo: Loma la Mina, SE side to E Peak, *Shafer 3281* (US). Patillas: Carite Forest Reserve, *Proctor 48487* (SJ). Peñuelas: Bo. Rucio, upper slopes of Cerrote de Peñuelas, *Proctor & Haneke 43268* (SJ). Ponce: Toro Negro State Forest, *Proctor 40079* (US, SJ). Río Grande: Caribbean Natl. Forest, summit of Mt. Britton, *Proctor 41484* (SJ).

4. Anthurium scandens (Aubl.) Engl. in Martius, Fl. Bras. 3(2): 78. 1878; *Dracontium scandens* Aubl., Hist. Pl. Guiane 836. 1775. Epitype: Haiti; vic. of Port de Paix, La Coup road, 22 Jan 1929, *Leonard 12281* (US), here designated.

Fig. 1. A-F

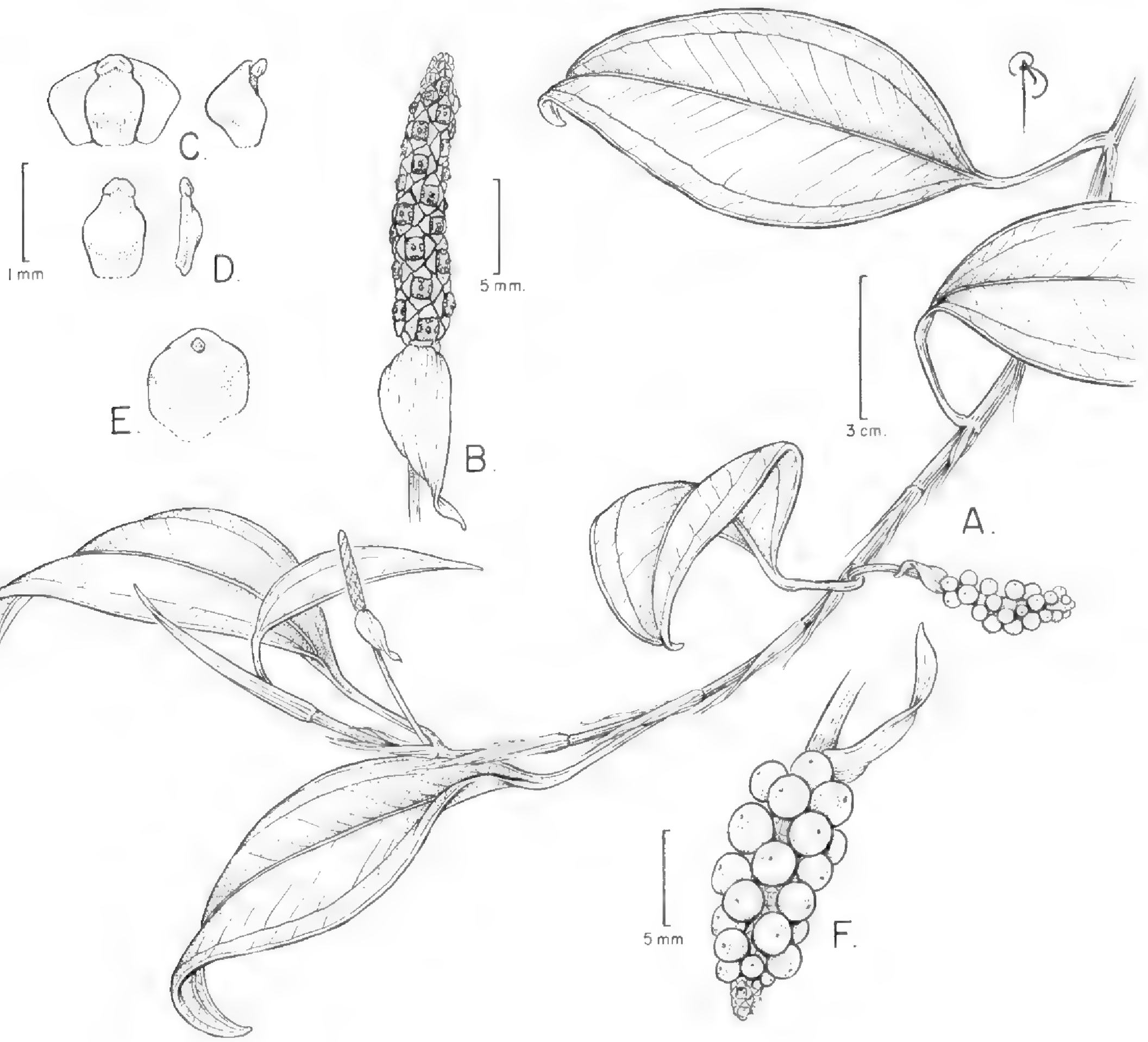


Fig. 1. A-F. *Anthurium scandens*. **A.** Fertile branch. **B.** Inflorescence. **C.** Flower, and stamen with accompanying tepal. **D.** Stamen, frontal and side views. **E.** Fertilized ovary. **F.** Infructescence. From Acevedo-Rdgz., P. 2003, Bejucos y plantas trepadoras de Puerto Rico e Islas Vírgenes, Smithsonian Institution.

Glabrous, epiphytic, herbaceous vine, climbing by means of adventitious roots; stem cylindrical, to 5 mm in diam., 1-2 m long, internodes with persistent, straw-colored, fibrous leaf sheaths (cataphylls), weathering into persistent fibers. Leaves alternate; blades simple, 7-13 × 2.5-5 cm, lanceolate-elliptic or elliptic, chartaceous, the apex acuminate, the base obtuse or attenuate, the margins entire; upper surface glabrous, foveate; lower surface glabrous, with numerous dark punctations; petioles 0.7-4.5 cm long. Inflorescence axillary, ascending; spathe 1-1.2 cm long, reflexed, green with purplish venation, lanceolate; spadix ascending, 1.5-2 cm long. Berry white, depressed-globose, ca. 5 mm in diam.; seeds ellipsoid, ca. 1 mm long.

General distribution: Widely distributed throughout the Neotropics.

Distribution in Puerto Rico: Common epiphytic vine of moist to wet forest. Adjuntas, Aibonito, Arecibo, Bayamón, Camuy, Cayey, Ciales, Guayama, Luquillo, Maricao, Naguabo, Ponce, Río Grande, Salinas, San Sebastián, Utuado, and Yauco.

Common name: Puerto Rico: *Guinda.*

Note: In his original publication of *Dracontium scandens*, Aublet cited Plumier's *Descr. Pl. Amér. fig. 74* as the type for this name. However, fig. 74 is a species of *Pothomorphe* (Piperaceae). This apparent mistake was corrected by Sheffer et al.

(1980) when they indicated that the type was actually Plumier's fig. 78. As they indicated, Plumier's fig. 78 does not match what has been traditionally recognized as *Anthurium scandens*, the inflorescence as depicted and described by Plumier is way too long. According to Dr. Tom Croat (MO), the referred plate, does not represent any West Indian species even remotely. He thinks that more likely it represents a mixed collection or even something entirely made up. The gland-dotted leaves are fine but the inflorescence must be from a different (birds nest) *Anthurium*. In view of the ambiguity of the current type of *Anthurium scandens* we have decided to epiypify this name with a specimen from the type locality (near Port de Paix) cited by Plumier, which clearly represents this well-known and common species.

Selected specimens examined: PUERTO RICO: Adjuntas: Monte Guilarte State Forest, Bo. Garzas, Mountain slopes c. 1.3-1.5 km due SE of Monte Guilarte Peak, *Proctor & Alemañy 45835* (SJ). Aibonito: *Stevenson 5044* (US). Arecibo: Río Abajo Forest Reserve, *Acevedo-Rdgz. 9395* (UPR, UPRRP, US). Bayamón: Bo. Guaraguao Arriba: upper slope & summit of Cerro La Peña, *Proctor 41706* (SJ). Camuy: Montañas Guarionex, Bo. Puertos, Top of mogote 0.45 km due SSE of intersection, Roads 119 & 456, *Proctor et al. 48919* (SJ). Cayey: Bo. Carmen, along crest (S side) of Sierra Jajome, 2-2.8 km due NE-ENE. of village of Carmen, *Proctor 46929* (SJ, US); Cayey, *Underwood & Griggs 415* (US). Maricao: Monte Montoso, *Britton & Cowell 4138* (US). Ciales: along trail Camino de la Ceiba towards Quebrada del Pozo Azul, *Acevedo-Rdgz. 11880* (UPRRP, US). Naguabo: Río Icaco and adjacent hills, *Shafer 3562* (US). Ponce: on the Adjuntas Road, 11 mi. from Ponce, *Heller 6357* (US). Río Grande: along Road 186 to El Verde area of Caribb. Natl. Forest, *Acevedo-Rdgz. & Siaca 9339* (UPR, UPRRP, US). Salinas: Bo. Lapa, summit of western peak, Las Tetas de Cayey, *Proctor 41931* (SJ). Río Grande: Sierra de Luquillo, *Sintenis 1505* (US). San Sebastián: Bo. Guajataca, along W side of Río Guajataca in gorge S of Lago de Guajataca, *Proctor et al. 48118* (SJ). Utuado: *Britton & Cowell 1031* (US). Yauco: Bo. Sierra Alta, summit area of Pico Rodadero, *Proctor & Díaz 44737* (SJ).

5. Anthurium × selloum K. Koch in Klotzsch, App. Gen. Sp. Nov. 1855: 8. 1855-56.

Neotype: St. John, U. S. Virgin Is. *Krebs, s. n.* (C), designated by Croat [as lectotype [1]], Ann. Missouri Bot. Gard. 78: 727. 1991.

Fig. 59. B

Glabrous, erect, terrestrial or seldom epiphytic herb, 0.5-1 m tall; stem erect, short, with numerous adventitious roots; cataphylls to 18 cm long, persistent, weathering to show numerous fibrous remnants. Leaves numerous, ascending, spirally arranged in a loose rosette; blades 30-70 × 13-26 cm, lanceolate, oblong-lanceolate or cordate-lanceolate, coriaceous, strongly reticulate-veined, the apex obtuse to short-acuminate, the base cordate to nearly truncate, the margins entire, slightly wavy; petioles 30-50 cm long, cylindrical, canaliculate along the ventral surface, swollen at point of attachment with blade. Inflorescence ascending; peduncles 60-103 cm long, cylindrical; spathe to 15 cm long, spreading to reflexed, green, leafy, oblong-lanceolate; spadix ascending, 15-40 cm long, dark brown, cylindrical, narrowed toward the apex. Sterile, not producing berries.

General distribution: Endemic to the mountains of St. John and Tortola; locally common understory herb of shaded moist forests. Grown as a garden plant on Tortola.

Note: Anthurium × selloum seems to be a sterile hybrid between *A. cordatum* and *A. crenatum*. It has never been described, collected, or observed in fruit; the inflorescences develop normally but die before setting fruits. Ovules and pollen grains are produced, but the pollen is not available since the anthers do not dehisce. Although *A. × selloum* is capable of vegetative reproduction, most individuals seem to be the result of crossing from the two putative parent species. The morphology of *Anthurium × selloum* is intermediate between that of the parent species, and the taxon is normally found where the parent species occur together.

[1] Koch's description of *A. selloum* was based on plants cultivated at B, and did not include the specimen collected by Krebs on St. John. Therefore, the Krebs specimen is not original material and cannot be regarded as a lectotype but instead as a neotype.

Selected specimens examined: ST. JOHN: Bordeaux, *N.L. Britton & Shafer 560* (US); Cruz Bay Quarter, *Acevedo-Rdgz. & Siaca 3810* (MO, NY, US). TORTOLA: Pickate Ghut, W of Mt. Sage, *Proctor & Barwick 41984* (SJ).

Cultivated Species

Anthurium andreanum Linden and *A. longilaminatum* Engl., both native to South America, were reported by Martorell et al. (1981) as cultivated in Puerto Rico.

3. CALADIUM

Caladium Vent., Mag. Encycl. 4(16): 463. 1801.

Acaulescent, tuberous herbs. Leaves simple or rarely trisect, several in a loose rosette, often peltate and variegated, cordate or sagittate, secondary veins forming an irregular collecting vein between the primary lateral veins; petiole long, with distinct sheath. Inflorescence pedunculate, 1 per node. Spathe erect, constricted, the basal area forming a convolute, green tube that surrounds the spadix, the upper area opened into a whitish and withering blade; spadix cylindrical, erect, stipitate or sessile, pistillate below and staminate to the apex with a constricted transition zone of sterile flowers. Flowers unisexual, the perianth wanting; stamens 3-5, united into truncate synandria with marginal thecae; ovary incompletely 2- or 3-locular, with many parietal ovules, the stigma sessile. Fruit a fleshy, 1- to many-seeded, whitish berry; seeds ovoid to ellipsoid, with many longitudinal grooves. A genus of about 12 species native to the Neotropics, but one species widely cultivated and escaping in the tropics.

LECTOTYPE: *Caladium bicolor* (Aiton) Vent. (≡ *Arum bicolor*), *typ. conserv. prop.*

1. Caladium bicolor (Aiton) Vent., Mag. Encycl. 4(16): 464. [22 Dec 1800-21 Jan]1801; *Arum bicolor* Aiton, Hort. Kew. 3: 316. 1789. *Cyrtospadix bicolor* (Aiton) Britton & P. Wilson, Bot. Porto Rico 5: 126. 1923. Neotype: Madeira Is., *Bot. Mag. 21: fig. 820. 1805*, here designated [2].

Xanthosoma sylvestre Bello, Anales Soc. Esp. Hist. Nat. 12: 114. 1883. Type: Puerto Rico. *Bello, s. n.* (destroyed).

Glabrous, erect acaulescent herb with an obconical, fleshy corm at base. Leaves 1-2; blades pointing downward, ca. 30 × 20 cm, lanceolate to hastate, chartaceous, usually with small, irregular whitish or pinkish spots, or variegated along secondary veins, less often completely green, glaucous beneath, the apex acute or shortly acuminate, the base peltate, cordate, the margins more or less wavy; petioles erect, 35-55 cm long, sheathing, white at the very base, usually with purple stripes. Inflorescences axillary, ascending, solitary; peduncles as long as or little shorter than the petioles, cylindrical, green, usually with purple stripes; spathe chartaceous, glaucous, to 14 cm long, the blade twice as long as the tube, withering, elliptic, apiculate at apex; spadix shorter than the spathe, the staminate zone twice as long as the pistillate.

General distribution: Native to South America, but widely cultivated as a foliage ornamental, naturalized in tropical and subtropical areas.

Distribution in Puerto Rico and the Virgin Islands: Cultivated as ornamental and naturalized in open disturbed, moist areas, common along rivers and swampy areas. Aguas Buenas, Aibonito, Arecibo Bayamón, Ciales, Mayagüez, Quebradillas, and San Juan.

Common names: Puerto Rico: *Paleta de pintor, Malanga cimarrona, Yautía cimarrona.*

Note: [2] The plant used by Aiton to describe this species was presumably from the Madeira Islands and perhaps cultivated at K. Searches in K or BM for a specimen that could be regarded as the type for this name have failed, suggesting that the plant was never vouchered with a herbarium specimen. As a result, we are designating a neotype for this commonly cultivated species.

Selected specimens examined: PUERTO RICO: Aguas Buenas: *Sintenis 2515* (US). Arecibo: Bosque de Río Abajo, carretera 621, *Acevedo-Rdgz. & Laboy 174* (SJ). Bayamón: *Stevenson 386* (US). Mayagüez: vicinity of Cerro Las Mesas, *Cowell 552* (US). Quebradillas: Bo. Cacao, along E side of Río Guajataca at bottom of canyon, 0.5-1 km SE to SSE of mouth of Quebrada, *Proctor 50208* (SJ, US). San Juan: Santurce, *Goll et al. 78* (US).

4. COLOCASIA

Colocasia Schott in Schott & Endlicher, Melet. Bot. 18. 1832, *nom. conserv.*

Small to large herbs, the stems subterranean and tuberous, or epigeal and massive. Leaves simple, several in a rosette in acaulescent species or terminal in arborescent species, often peltate, secondary veins forming a collective vein between the primary lateral veins; petiole long, with distinct sheath. Inflorescence pedunculate, 1 to many per node. Spathe erect, constricted, the basal area forming a convolute, accrescent tube that surrounds the spadix base, the blade much longer than the tube, white or yellow and withering; spadix erect, sessile, shorter than the spathe, with a sterile distal portion (appendage), and a basal pistillate zone, separated from the staminate zone by a narrower zone of sterile flowers. Flowers unisexual, lacking perianth; stamens 3-6, connate into a truncate synandrium; ovary 1-locular, with numerous parietal ovules, the style short, the stigma discoid-capitate or 2-lobed. Berry oblong, green or white, many-seeded; seeds ovoid to ellipsoid, with numerous grooves. A genus of 8 species native to tropical Asia, with 1 species cultivated and naturalized throughout the tropics.

TYPE: *Colocasia antiquorum* Schott (≡ *Arum colocasia* L.), *typ. conserv.*

1. Colocasia esculenta (L.) Schott in Schott & Endicher, Melet. Bot. 18. 1832; *Arum esculentum* L., Sp. Pl. 965. 1753. Lectotype: Jamaica. Sloane, *Voy. Jamaica 1: t. 106, f. 1. 1707,* designated by Nicolson in A. C. Smith, Fl. Vit. Nov. 1: 456. 1979.

Arum colocasia L., Sp. Pl. 965. 1753; *Colocasia antiquorum* Schott in Schott & Endicher, Melet. Bot. 18. 1832; *Caladium colocasia* (L.) W. Wight, Contr. U. S. Natl. Herb. 9: 206. 1905. Lectotype: *"Habitat in Cretae, Cypri, Syriae, Aegypti aquosis."* (LINN-1079.4), designated by Mayo in Bosser et al., Fl. Mascareignes 192: 18.1984.

Fig. 59. C

Glabrous, acaulescent herb, with a massive, fleshy corm at base, with lateral, thick, edible runners. Leaves in a loose rosette; blades pointing downward, 23-55 × 12-38 cm, cordate or lanceolate, sub-coriaceous, green above, glaucous below, the apex obtuse, acute or shortly acuminate, the base peltate-cordate, the margins more or less wavy, with a submarginal collecting vein; petioles erect, to 85 cm long, inserted 3-7 cm from base of blade, invaginate on lower 1/3. Inflorescences axillary, ascending, solitary; peduncles nearly as long as the petiole, cylindrical; spathe fleshy, to 35 cm long, the tube green, the blade lanceolate, not much wider than the tube, yellow to orange, flexing open near the base, then deflexing and dropped; spadix yellow, much shorter than the spathe, the sterile flower zone and the distal appendage shorter than the fertile zones.

General distribution: Perhaps native to SE Asia, now pantropically cultivated and escaped.

Distribution in Puerto Rico and the Virgin Islands: Commonly cultivated for its edible tubers, sometimes persistent or naturalized along river banks and moist forest understory. Arecibo, Caguas, Carolina, Jayuya, Loíza, Salinas, San Juan, and Toa Baja.

Common names: Puerto Rico: *Malanga, Yautía malanga.*

Selected specimens examined: PUERTO RICO: Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10783* (UPRRP, US). Caguas: Bo. Bairoa, along or near Río Bairoa just NE of hwy 30 bridge, *Proctor & Colón 50045* (SJ). Carolina: 204 St. Country Club, *Ortega 121* (UPRRP). Jayuya: Cerro Punta, open eroded slope, *Acevedo-Rdgz. et al. 14450* (UPRRP, US). Loíza: Bo. Medianía Alta, along sandy dike, NW bank of Río Herrera at S end of road 964, *Proctor et al. 49607* (SJ, US). Salinas: Bo. Lapa, vicinity of Las Tetas de Cayey, *Proctor & Thomas 44612* (SJ). San Juan: Río Piedras, UPR Botanic Garden, muddy field on edge of secondary forest, *Acevedo-Rdgz. 14454* (UPRRP, US). Toa Baja: Bo. Candelaria, wooded mogotes 0.6-0.7 km WSW of Pico Nevárez, *Proctor & Thomas 45619* (SJ).

5. DIEFFENBACHIA

Dieffenbachia Schott, Wiener Z. Kunst 1829: 803. 1829.

Erect to decumbent herbs, usually of wet or swampy areas; stems thickened, elongate, usually fragile, producing a whitish, poisonous, caustic sap. Leaves simple, usually spotted or variegated, mostly borne distally on stems, long-petiolate. Inflorescence 2-several per node; cataphylls short and inconspicuous. Spathe greenish, persistent, partially enclosing the spadix, more or less constricted at the middle, the basal part elongated, forming a tube with convolute margins, the upper part a short, erect or recurved blade; spadix cylindrical, shorter than the spathe, the pistillate zone (basal) basally to entirely adnate to the spathe, laxly-flowered, separated from the staminate zone by a sub-naked axis with scattered sterile staminate flowers, the staminate zone distal, sub-cylindrical, longer than the free pistillate portion of the spadix. Flowers unisexual, the perianth wanting, pistillate flowers with 4 staminodes; stamens 4-5; ovary 1- to 3-locular, with a solitary ovule per locule, the stigma sessile, nearly globose to 3-lobed. Fruit a fleshy berry; seeds ovoid to globose. A genus of about 135 species native to the Neotropics.

TYPE: *Dieffenbachia seguine* (Jacq.) Schott (≡ *Arum seguine* Jacq.)

Reference: Croat, T.B. 2004. Revision of *Dieffenbachia* (Araceae) of Mexico, Central America, and the West Indies. Ann. Missouri Bot. Gard. 91: 668-772.

1. Dieffenbachia seguine (Jacq.) Schott, Wiener Z. Kunst 1829: 803. 1829; *Arum seguine* Jacq., Enum. Syst. Pl. 31. 1760; *Dieffenbachia plumieri* Schott, Oesterr. Bot. Wochenbl. 2: 69. 1852, *nom. illeg.* Lectotype: West Indies. Plumier, *Descr. Pl. Amér., t. 61, 1693,* designated by R.A. Howard, Fl. Lesser Antill. 3: 389. 1979.

Caladium maculatum Lodd., Bot. Cab. 7: 608. 1822; *Dieffenbachia maculata* (Lodd.) G. Don in Sweet, Hort. Brit., ed. 3, 632. 1839. Type: South America. Lodd., *Bot. Cab. 7: t. 608. 1822.*

Figs. 2. H, I; 59. D

Erect to decumbent herb to 2 m tall; stem cylindrical, ca. 3 cm diam., green with leaf scars, producing a milky or watery, caustic sap when cut. Leaves borne distally on stems; blades usually spotted or variegated, 20-50 × 12-24 cm, elliptic or oblong-ovate, chartaceous, the apex acute or acuminate, the base rounded or cordate, usually asymmetric, the margins entire; petioles 30-40 cm long, sheathing. Inflorescences axillary, ascending, in groups of 2 or 3; peduncles 4-15 cm long, cylindrical; spathe coriaceous, 18-30 cm long, green, erect, opening throughout its length, keeled at apex; spadix shorter than the spathe, with green axis; pistillate zone with widely spaced flowers with yellow stigmata and 4 white staminodes; staminate zone densely clustered, cream. Berry orange-red.

General distribution: Throughout tropical America.

Distribution in Puerto Rico and the Virgin Islands: An occasional herb of swamps, moist forests, wet seepage, sunny to partly shaded areas. Arecibo, Bayamón, Cayey, Ciales, Fajardo, Maricao, Naguabo, Río Grande, San Juan, Utuado, and Vega Alta; St. John, St. Thomas, and Tortola.

Common names: Puerto Rico: *Rábano, Rábano cimarrón.* Virgin Islands: *Dumb cane.*

Notes: The sap of this plant is irritating to the skin, and if ingested is inflammatory to the tongue and digestive tract, hence the common name, dumb cane.

Selected specimens examined: PUERTO RICO: Arecibo: Río Abajo State Forest, wetland just S of Road 621, 0.8 km due W of Campamento Crozier, *Proctor & Chabert 44721* (SJ). Bayamón: Bo. Guaraguao Arriba, along Road 879 ca. 1 km due WSW of Cerro La Peña, *Proctor & Thomas 44558* (SJ). Cayey: Bo. Lapa, NW side, summit ridge of Cerro Avispa, *Proctor 42761* (SJ). Ciales: along trail Camino de la Ceiba towards Quebrada del Pozo Azul, *Acevedo-Rdgz. & Vicens 11876* (UPRRP, US). Fajardo: Colonia San Miguel, *N.L. Britton & Shafer1625* (US). Maricao: *Sargent 643* (US). Mayagüez: vic. of Cerro Las Mesas, *Cowell 550* (US). Naguabo: Río Icaco & adjacent hills, *Shafer 3484* (US). Río Grande: Caribbean Natl. Forest, El Verde Field Station, *Thompson & Thompson 3238* (US). San Juan: Río Piedras, *Stevenson 2160* (US). Utuado: Bo. Don Alonso,



Fig. 2. A-G. *Anthurium cordatum.* **A.** Habit. **B.** Leaf. **C.** Infructescence. **D.** Flower, top view. **E.** Stamen with subtending perianth segment. **F.** Stamen, frontal and lateral views. **G.** Ovary and l.s. ovary. **H-I.** *Dieffenbachia seguine.* **H.** Fertile branch. **I.** Inflorescence and subtending leaf. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

Acevedo-Rdgz. 13418 (FTG, NY, US).Vega Alta: Bo. Sabana; NE of Regadera, *Proctor & Thomas 44571* (SJ, US). St. John: Maho Bay Gut, *Woodbury 863/7293* (VINPS). Tortola: Road Town to High Bush, *N.L. Britton & Shafer 762* (US).

6. DRACONTIUM

Dracontium L., Sp. Pl. 967. 1753.

Erect, small to large herbs, acaulescent with a depressed-subglobose tuber. Leaves solitary; blade trisected; petiole stout, long, often verrucose and with banded variegation, sheathed only at base. Inflorescence 1(2) per node; cataphylls conspicuous. Spathe erect, boat-shaped, brown-purple outside, reddish purple outside, marcescent or persistent, partially enclosing the spadix, not constricted, basally convolute; spadix cylindrical or ellipsoid, sessile or stipitate, much shorter than the spathe, flowers fertile throughout, except for a few sterile apical ones. Flowers bisexual, with 4-8 sepals; stamens 4-5, free; ovary ovoid incompletely 1-to 6-locular, with a solitary axial or basal ovule per locule, the style elongated, the stigma sub-globose to 3-lobed. Berry obpyramidal greenish brown; seeds rounded to reniform. A genus of about 23 species native to Central America, South America, Lesser Antilles and Puerto Rico.

LECTOTYPE: *Dracontium polyphyllum* L., designated by Britton & P. Wilson, Bot. Porto Rico 5: 130. 1923.

References: Zhu, G. H. & M. H. Grayum. 1995. Two hitherto confused species, *Dracontium polyphyllum* and *D. asperum* (Araceae), and typification of their names. Taxon 44: 519-523. Zhu, G. 1995. Systematics of *Dracontium* (Araceae). Ph. D. dissertation, University of St. Louis, Missouri. Zhu, G. & T. B. Croat. 2004. Revision of *Dracontium* (Araceae). Ann. Missouri Bot. Gard. 91: 593-667.

1. Dracontium asperum K. Koch, Wochenschr. Gärtnerei Pflanzenk. 33: 259. 1859. Neotype: Surinam. *Irwin 55045* (NY; COL, F, GH, K, US!, VEN), designated by Zhu & Grayum, Taxon 44: 522. 1995.

Dracontium polyphyllum sensu authors, non Linnaeus, 1753.

Fig. 59. E, F

Acaulescent herb with a hemispherical tuber and numerous lateral smaller, elongated tubercles. Leaves solitary or less often two or three; blades ascending, then the lobes spreading horizontally, trisected, green, chartaceous, 70-100 × 70-100 cm, the middle segments usually twice triparted from the middle, the laterals usually 2-parted below the middle, lower surface with prominent primary and secondary veins, the segments acuminate at apex, with entire to wavy margins; rachis nearly terete; petioles 1-2 m long, nearly terete, with banded variegation and rough excrescences, especially in lower half. Inflorescences solitary, ascending; peduncles 15-45 cm long above ground, cylindrical, ca. 1 cm in diam. at base, with same banded pattern as petiole; cataphyll much shorter than the peduncle; spathe 14-20 cm long, reflexed at apex, with overlapping margins on lower portion completely covering the spadix, inner surface purple to purplish red, with a whitish area at the base; spadix cream, ca. 7 cm long, nearly elliptical. Berries depressed-globose to discoid, 8-12 mm in diam., 1-to 3-seeded, purplish brown or bluish black at maturity; seeds triangular to rounded.

General distribution: Puerto Rico, Lesser Antilles, Trinidad and Tobago, Guyana, Surinam, and Brazil.

Distribution in Puerto Rico: A rare herb of wet seepage, shaded areas or shaded river banks. Arecibo, Quebradillas, Río Grande, San Sebastián.

Common name: Puerto Rico: *Guapa.*

Selected specimens examined: Puerto Rico: Arecibo: Río Abajo State Forest, *Proctor et al. 46104* (SJ); Sector Arrozales; Bo. Sabana Hoyos, understory of secondary forest, *Acevedo-Rdgz. et al. 13402* (US). Quebradillas: Bo. San Antonio, *Proctor et al. 46460, 48047* (SJ). Río Grande: Sierra de Luquillo, *Proctor & Rivera 47976* (SJ). San Sebastián: Bo. Aibonito, Area Recreativa de Guajataca, *Proctor 48044* (SJ). Bo. San Antonio, 0.9 km due SW of jct. of Rd. 437 with Rd. 113, *Proctor 48047* (US).

7. EPIPREMNUM

Epipremnum Schott, Bonplandia 5: 45. 1857.

Robust, root-climbing vines. Leaves alternate, simple or pinnately dissected; petioles distally pulvinate, with a winged sheath that usually withers into numerous, persistent fibers. Inflorescences 1(2) per node. Spathe fleshy, boat-shaped, not constricted, usually deciduous or withering after anthesis, covering the spadix; spadix sub-cylindrical, thickened, erect, sessile or stipitate, shorter than the spathe, flowers fertile throughout. Flowers bisexual, without perianth; stamens 4, free; ovary prismatic, truncate at apex, unilocular, with 2 (-8) basal or parietal ovules. Berries yellowish, 1- to 8-seeded; seeds reniform, smooth. Genus of 20 species native to tropical SE Asia, Australia, and western Pacific, with a few species cultivated and naturalized throughout the tropics.

TYPE: *Epipremnum mirabile* Schott (≡ *E. pinnatum* (L.) Engl.).

Key to the taxa of *Epipremnum*

1. Leaves green, not variegated; pinnately dissected, or the juveniles simple; stems and petioles green, usually flowering and fruiting ..... 1. *E. pinnatum*
1. Leaves variegated (green-yellow), simple or less often pinnately dissected; stems and petioles yellow-orange; seldom flowering ..... 2. *E. pinnatum* 'Aureum'

1. Epipremnum pinnatum (L.) Engl., Pflanzenr. IV. 23B (Heft 37): 60. 1908; *Pothos pinnatus* L., Sp. Pl. ed. 2, 1374. 1763. Holotype: Ambon (Molucca Is.). Rumphius, *Herb. Amboin. 5: 489, t. 183, f. 2. 1747.*

Philodendron nechodomae Britton in Britton & P. Wilson, Bot. Porto Rico 6: 335. 1926. [as "*nechodomi*"] Type: Puerto Rico. *Britton & Boynton 8261* (holotype: NY!)

Fig. 3. A-C

Herbaceous root-climber, 6-8 m long. Stems flexible, cylindrical, green, to 3 cm in diam., producing scanty watery sap; bark papery. Leaves alternate, glabrous, green, not variegated, chartaceous, dimorphic; juvenile leaves simple, ascendant; adult leaves hanging, pinnately dissected, to 50 × 30 cm, the apex acuminate, the base asymmetric, sub-cordiform; lower surface with prominent venation, and a line of domatia along both sides of the midvein, and sometimes with pin-pricks; petioles to 35 cm long, marginate throughout. Inflorescence axillary, solitary, erect; spathe sub-cylindrical, to 18 cm long, fleshy, yellowish, opening along one side, acuminate at apex; spadix sessile, nearly cylindrical, 12-15 cm long. Berries not known.

General distribution: Native to E India to SE Asia into Oceania. Occasionally cultivated throughout the tropics and becoming naturalized.

Distribution in Puerto Rico and the Virgin Islands: Cultivated and perhaps naturalized in Puerto Rico, Dorado, Río Grande, and Utuado; naturalized on St. Thomas.

Selected specimens examined: PUERTO RICO: Mayagüez: Federal Experimental Extension, *Acevedo-Rdgz. 10838* (US). San Juan: Pennock's Nursery, Hato Rey, cultivated, *Howard & Nevling 16921* (US).

2. Epipremnum pinnatum 'Aureum' Nicolson, Allertonia 1: 347. 1978.

Pothos aureus [as "*aurea*"] André, Ill. Hort. 27: 69 t. 381. 1880; *Epipremnum aureum* (André) G. S. Bunting, Ann. Missouri Bot. Gard. 50: 28. 1963. Type: Solomon Is. André, *Ill. Hort. 27: 69, t. 381. 1880.*

Fig. 3. D, E

This cultivar is similar to the wild species except that it is usually more robust, reaching more than 10 m long, the stems and petioles are yellow-orange, and the leaves are variegated with yellow. Juvenile leaves are 7-10 cm long and entire while the adult ones reach 35 cm in length, and are irregularly pinnatifid. Seldom collected in flower, fruits not known.

General distribution: Originally reported from Solomon Islands but probably from



Fig. 3. A-C. *Epipremnum pinnatum*. **A.** Sterile branch. **B.** Leaf. **C.** Inflorescence. **D-E.** *Epipremnum pinnatum* 'Aureum'. **D.** Sterile branch. **E.** Leaf. From Acevedo-Rdgz., P. 2003, Bejucos y plantas trepadoras de Puerto Rico e Islas Vírgenes, Smithsonian Institution.

cultivation; cultivated and naturalized throughout the tropics.

Distribution in Puerto Rico: Naturalized, common in moist secondary forests. Arecibo, Dorado, Jayuya, Río Grande, and Vega Baja.

Common name: Puerto Rico: *Bejuco de agua.*

Selected specimens examined: PUERTO RICO: *Birdsey s.n.* (US). Dorado: Bo. Higuillar, moist secondary forest 0.8 km due NW of intersection, Roads 683 & 697, *Proctor 48592* (SJ). Río Grande: along Road 191 to El Yunque Forest Reserve, *Acevedo-Rdgz. & Siaca 9334* (UPR). Utuado; along Rt. 146, ca. 5 km from Dos Bocas Lake, *Acevedo-Rdgz. et al. 7141* (HAC, UPRRP, US). ST. THOMAS: Peterborg, *Acevedo-Rdgz. 11260* (UPRRP, US).

8. MONSTERA

Monstera Adans., Fam. Pl. 2: 470. 1763, *nom. conserv.*

Robust or slender root climbers; stems smooth or verrucose. Leaves alternate; blades simple, entire or laciniate, usually perforated; petioles elongated and winged. Inflorescences 1-several per node. Spathe thickened, ovate, oblong-ovate, boat-shaped, not constricted, convolute at base, white to rose within, deciduous; spadix sessile, cylindrical, thickened, erect, little shorter than the spathe; lower flowers usually sterile. Flowers bisexual, lacking perianth; stamens 4, free; ovary prismatic, truncate at apex, bilocular, with 2 basal ovules per locule, the stigma punctate or linear. Berries green, white, yellow or orange; seeds 1-3, obovoid or ellipsoid. Genus of approximately 40 species native to continental tropical America and the Lesser Antilles.

TYPE: *Monstera adansonii* Schott (≡ *Dracontium pertusum* L.), *typ. conserv.*

Reference: Madison, M. 1977. A revision of *Monstera* (Araceae). Contr. Gray Herb. 207: 3-100.

1. Monstera adansonii Schott, Wiener Z. Kunst 1830: 1028. 1830; *Dracontium pertusum* L., Sp. Pl. 967. 1753, non *Monstera pertusa* (Roxb.) Schott, 1830. Type: Martinique. Plumier, *Descr. Pl. Amér., t. 56, 57. 1693.*

Fig. 4. A-C

Glabrous, herbaceous, root-climber. Stems flexible, cylindrical, green, 0.5-2.5 cm in diam., producing scanty watery sap. Leaves alternate, simple, dimorphic; blade asymmetrically elliptic-lanceolate, chartaceous, basal leaves not perforated, distal leaves perforated, 26-47 × 13-22.5 cm, the apex short- or long-acuminate, the base asymmetric, one side cuneate, the other obtuse; upper surface dull, with wide, flattened midvein; lower surface light green, with prominent midvein and darker lateral secondary veins; petioles winged almost to the apex, shorter than the blade. Inflorescence axillary, solitary, erect; spathe boat-shaped, to 20 cm long, erect, adaxially cream or yellowish; spadix yellowish, ellipsoid, 8-13 cm long. Fruiting spadix yellow to orange.

General distribution: Native to continental tropical America.

Distribution in Puerto Rico: Exotic, cultivated and sometimes naturalized in moist forest understory. Río Grande.

Selected specimens examined: PUERTO RICO: Río Grande: Bo. Jiménez, Finca San Pedrito, *Proctor 50421* (SJ); Road 191 to El Yunque Forest Reserve, *Acevedo-Rdgz. & Siaca 9313* (UPR, US).

Cultivated Species

Monstera deliciosa Liebm., a more robust scandent or decumbent shrub, is sometimes cultivated in Puerto Rican gardens, but it is not known to grow in the wild.

9. PHILODENDRON

Philodendron Schott, Wiener Z. Kunst 1829: 780. 1829, *nom. conserv.*

Stout or slender vines, climbing by means of adventitious roots, or less often erect herbs; stems elongate, usually producing a watery, caustic sap. Leaves simple, lobed or variously divided or pinnatifid,

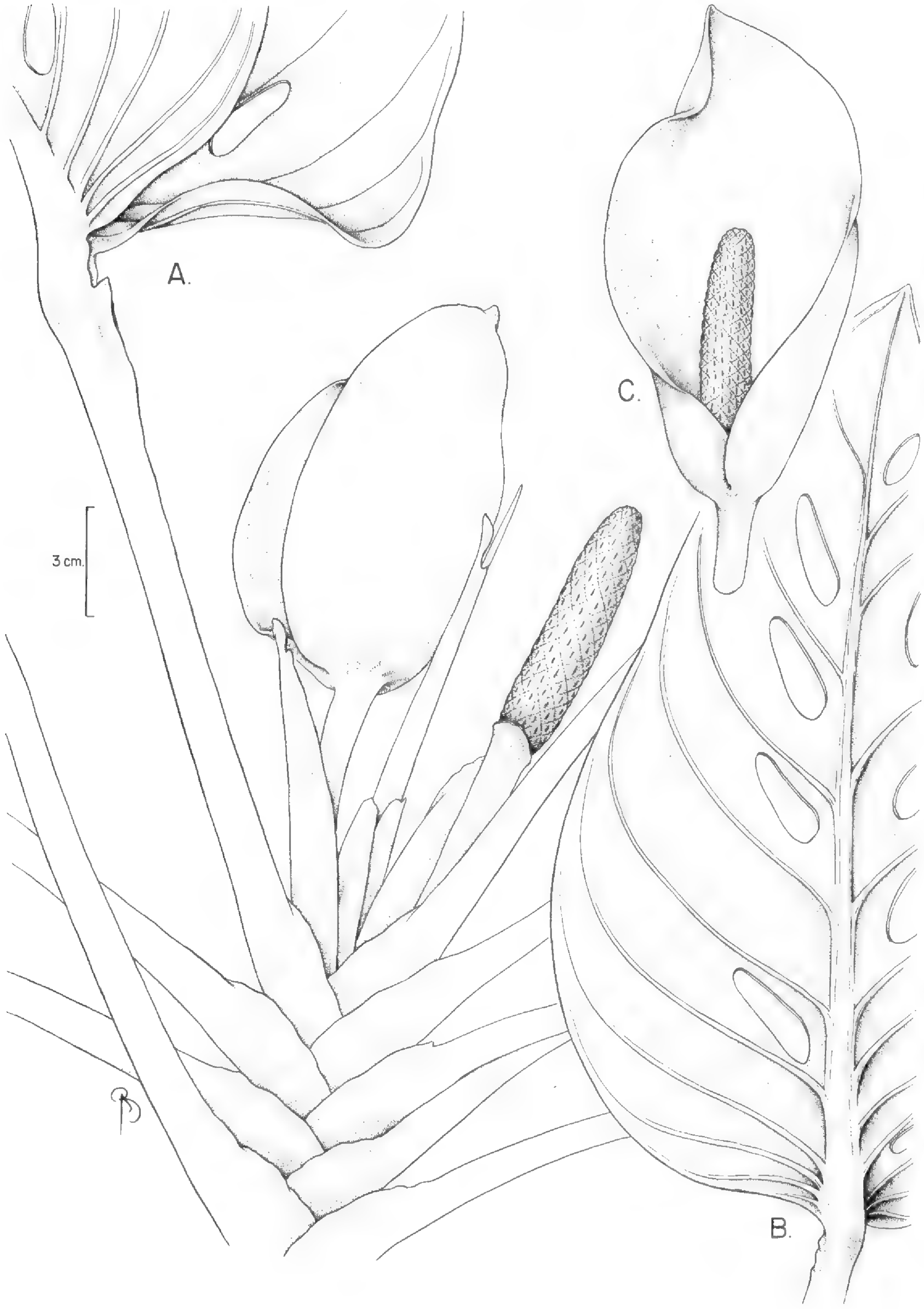


Fig. 4. A-C. *Monstera adansonii*. **A.** Fertile branch. **B.** Leaf. **C.** Spathe and spadix. From Mori, S. et al. 1997. Vascular plants of central French Guiana. Mem. NYBG Vol. 76(1).

long-petiolate. Inflorescence 1-11 per node. Spathe erect, convolute, surrounding the spadix, usually thickened, and constricted between the tube and the blade, not adnate to the spadix; spadix cylindrical, erect, usually nearly sessile, pistillate zone basal, separated from the staminate zone by a zone of sterile staminate flowers. Flowers unisexual, the perianth wanting; stamens 2-6; ovary 2- to many-locular, with 1 to many ovules per locule, the stigma sessile, entire or lobed. Fruit a fleshy, 1- to many-seeded berry; seeds ovoid to ellipsoid. A genus of about 275 species native to the Neotropics.

TYPE: *Philodendron grandifolium* (Jacq.) Schott (≡ *Arum grandifolium* Jacq.)

Reference: Arias Granda, I. 1998. El género *Philodendron* Schott (Araceae) en Cuba. Feddes Repert. 109: 33-39.

Key to the species of *Philodendron*

1. Petiole winged or margined nearly to the apical portion ..... 4. *P. lingulatum*
1. Petioles not winged or winged only on the lower half 2
2. Leaves pinnatilobed at margins ..... [*P. radiatum*]
2. Leaves with entire margins 3
3. Leaf blades 25-60 cm long; petioles 40-100 cm long; cataphylls persistent 4
4. Stems 8-10 cm in diam.; spathe shortly stipitate, ca. 45 cm long, thick, abaxially green, adaxially white ..... 2. *P. giganteum*
4. Stems 2-2.5 cm in diam.; spathe long-stipitate, ca. 18 cm long, coriaceous, abaxially whitish, adaxially burgundy ..... 5. *P. ornatum*
3. Leaf blades 13.5-35 cm long; petioles 10-35 cm long; cataphylls deciduous 5
5. Leaves oblong or lanceolate ..... 1. *P. consanguineum*
5. Leaves cordiform ..... 3. *P. hederaceum*

1. Philodendron consanguineum Schott, Syn. Aroid. 88. 1856. Type: "S. Domingue". Plumier, *Descr. Pl. Amér. t. 51a, 52. 1693.*

Philodendron angustatum Schott, Syn. Aroid. 103. 1856. Type: Haiti; Isle de la Tortue. Plumier, Descr. Pl. Amér. t. 51c & 54. 1693.

Philodendron krebsii Schott, Bonplandia 7: 164. 1859. Type: St. Thomas, U. S. Virgin Is. Krebs s. n. (holotype: C).

Philodendron wrightii Griseb., Cat. Pl. Cub. 219. 1866. Type: Cuba. *Wright 3211* (holotype: GOET; isotypes: GH, MO, NY, US!).

Philodendron marginatum Urb., Symb. Antill. 4: 135. 1903. Type: Puerto Rico. *Sintenis 4496b* (syntype: B, destroyed); *Sintenis 6927* (syntype: B, destroyed).

Philodendron fuertesii K. Krause in Urban, Symb. Antill. 7: 172. 1912. Type: Dominican Republic. *Fuertes 1184* (holotype: B, destroyed).

Philodendron urbanianum K. Krause in Urban, Symb. Antill. 7: 172. 1912. Type: Cuba. *Baker & van Hermann 4263* (syntype: B, destroyed); *Eggers 5143* (syntype: B ?).

Fig. 5. A, B

Herbaceous, glabrous root-climber, 10-30 m long. Stems flexible, cylindrical, reaching 2 cm in diam., producing scanty, watery, caustic sap; bark smooth, light brown or grayish, papery; nodes with an annular leaf scar. Leaves alternate, simple; blades 13.5-35 × 7.5-17.5 cm, oblong or less often lanceolate, coriaceous, lustrous, the apex acute or acuminate, the base cordiform, midvein stout, prominent on both surfaces; abaxial surface yellowish green with dark venation; petioles cylindrical, as long as the blade, winged along the lower ½. Inflorescence axillary, solitary; spathe green, erect, sub-cylindrical, with overlapping margins, 9-13 cm long; spadix sessile.

General distribution: Cuba, Hispaniola, Puerto Rico and the Virgin Islands.

Distribution in Puerto Rico and the Virgin Islands: In moist and wet forests. Adjuntas, Arecibo, Barranquitas, Bayamón, Cabo Rojo, Canóvanas, Dorado, Fajardo, Guayama, Guaynabo, Isabela, Lajas, Maricao, Ponce, Quebradillas, Río Grande, Sabana Grande, Salinas, Toa Baja, Vega Baja, and Yauco; St. Thomas.

Common names: Puerto Rico: *Bejuco de calabazón, Rasca garganta.*

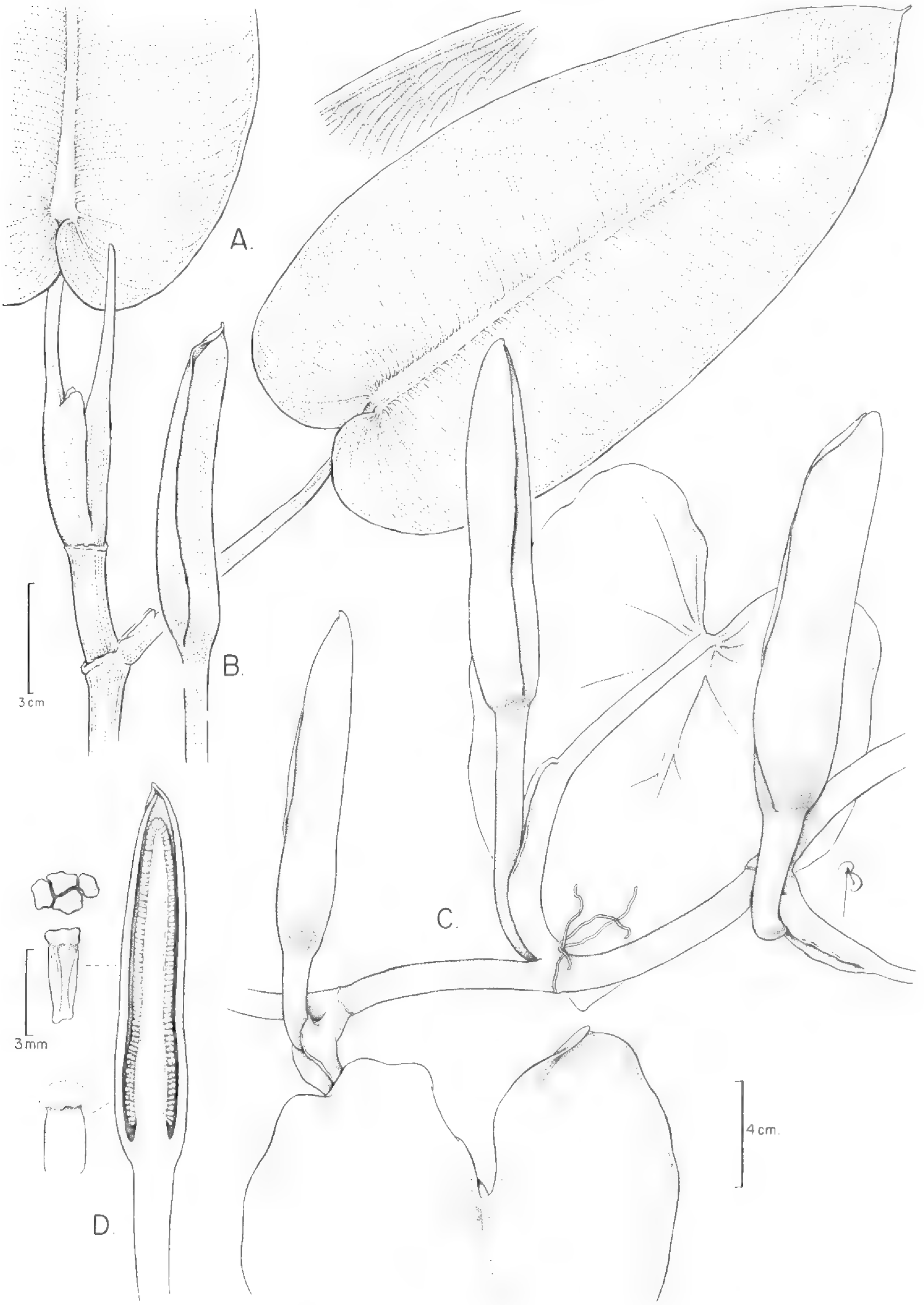


Fig. 5. A-B. *Philodendron consanguineum*. **A.** Branch. **B.** Inflorescence. **C-D.** *Philodendron hederaceum*. **C.** Fertile branch. **D.** Inflorescence, longitudinal section, with detail of the gynoecium and stamens. From Acevedo-Rdgz., P. 2003, Bejucos y plantas trepadoras de Puerto Rico e Islas Vírgenes, Smithsonian Institution.

Selected specimens examined: PUERTO RICO: Adjuntas: *Sintenis 4347* (US). Arecibo: Bo. Arrozal, NE of Road 637, km 6.4, *Proctor & Díaz 44774* (SJ). Barranquitas: Bo. Barrancas, upper NE slope & summit of Monte La Torrecilla, *Proctor & Thomas 44454* (SJ). Bayamón: Bo. Guaraguao Arriba, upper slopes & summit of Cerro La Peña, *Proctor & Foy 42323* (SJ). Cabo Rojo: Between Cabo Rojo and San Germán, *N. L. Britton et al. 4313* (US). Canóvanas: Sierra de Luquillo, Caribbean Natl. Forest, *Proctor & Taylor 46292* (SJ). Dorado: Bo. Higuillar, grounds of Dorado Beach Hotel, *Proctor 45104* (SJ). Fajardo: Colima San Miguel, *N.L. Britton & Shafer 1656* (US). Guayama: Bo. Carmen, along crest (S side) of Sierra de Jajome 2-2.8 km due NE-ENE of village of Carmen, *Proctor & Rivera 46941* (SJ, US). Guaynabo: Bo. Pueblo Nuevo, E end of Montes de Caneja, *Proctor & Rivera 51113* (SJ). Isabela: Bo. Coto, hwy 2, km 104.5, *Proctor & Vives 45119* (SJ). Lajas: Limestone cliffs, *Sargent 342* (US). Maricao: Bo. Indiera Fría, along track near Río Lajas below El Salto de Curet, *Proctor & Padrón 45676* (SJ). Ponce: Road from Ponce to Adjuntas, *Underwood & Griggs 753* (US). Quebradillas: Bo. San Antonio, distrito Montedero, *Proctor 46440* (SJ). Río Grande: Sierra de Luquillo, *Proctor 50419* (SJ). Salinas: Bo. Lapa, near summit of E peak, Las Tetas de Cayey, *Proctor & Thompson 44935* (SJ). Toa Baja: Bo. Candelaria, wooded mogotes 0.4-0.7 km WSW of Pico Nevárez, *Proctor & Carrasquillo 45305* (SJ). Vega Baja: *Goll 1032* (US). Yauco: Bo. Sierra Alta, summit area of Pico Rodadero, *Proctor & Díaz 44739* (SJ).

2. Philodendron giganteum Schott, Syn. Aroid. 89. 1856. Type: Unknown; representative material for this species and a good candidate for a lectotype of its name is Schott, *Icones Aroideae, t. 2685 (NYBG neg. 4123).*

Fig. 6. A-D

Erect, terrestrial or epiphytic plant, to 2 m tall, or a root-climber to 8 m long; stem cylindrical, 8-10 cm diam., producing scanty watery sap; cataphylls to 60 cm long, initially entire, weathering into persistent fibers. Leaf blades horizontal or directed downward, 25-60 × 17-50 cm, lanceolate or triangular-lanceolate, nearly coriaceous, slightly paler below, the apex obtuse to acute or acuminate, the base cordate, with sinuses not overlapping, the margins sinuate; petioles erect, to 1 m long, nearly cylindrical. Inflorescence axillary, solitary; peduncles 6-9 cm long, stout; spathe 14-21 cm long, constricted at the middle, with convolute margins on lower ½, to form an abaxially reddish tinged tube, the blade adaxially cream or white, abaxially yellowish green, with two brown spots where the margins overlap; spadix sessile, stout, as long as the spathe, with staminate portion whitish and pistillate portion yellowish green. Berry yellow to orange.

General distribution: Hispaniola, Puerto Rico, Virgin Islands, Lesser Antilles, Trinidad and Venezuela.

Distribution in Puerto Rico and the Virgin Islands: Uncommon terrestrial or epiphytic herb of moist forests. Aguas Buenas, Arecibo, Cabo Rojo, Fajardo, Guaynabo, Las Piedras, Luquillo, Río Grande, Toa Baja, Vega Alta, and Yabucoa; St. John, St. Thomas, and Tortola.

Selected specimens examined: PUERTO RICO: Aguas Buenas: Bo. Sonadora, S side of summit ridge, Cerro Marquesa, *Proctor 43062* (SJ). Arecibo: Río Abajo State Forest, *Proctor 41185* (SJ). Cabo Rojo: between Cabo Rojo and San Germán, *Britton et al. 4312* (US). Fajardo: Hillside forest, *N.L. Britton & Shafer 1685* (US). Guaynabo: Bo. Sonadora, upper N slopes of Cerro Marquesa, *Proctor 43085* (SJ). Las Piedras: Bo. Montones, Road 917, 0.2 km due NE of Escuela José D. Zayas, *Proctor 41568* (US). Luquillo: El Yunque forest reserve, Visley, *Acevedo-Rdgz. 10806* (US). Toa Baja: Bo. Candelaria, 0.4-0.7 km WSW of Pico Nevárez, *Proctor & Carrasquillo 45304* (SJ).Vega Alta: Bo. Sabana, limestone hills NE of Regadera, *Proctor 48503* (SJ). Yabucoa: Bo. Calabazas, hwy 3, appr. Km 101.5, *Proctor & Rivera 46944* (SJ). ST. JOHN: Coral Bay Quarter; Bordeaux Mountain, *Acevedo-Rdgz. 4705* (JBSD, MO, NY, UPR, US). TORTOLA: High Bush, *N.L. Britton & Shafer 828* (US); Upper slopes of Mt. Sage, *Proctor & Barwick 41978* (SJ).

3. Philodendron hederaceum (Jacq.) Schott, Wiener Z. Kunst 1829: 780. 1829; *Arum hederaceum* Jacq., Enum. Syst. Pl. 31. 1760. Lectotype: Colombia; Cartagena. Jacquin, *Select. Stirp. Amer. Hist., t. 152*, 1763, designated by G. S. Bunting, Baileya 11: 62. 1963.



Fig. 6. A-D. *Philodendron giganteum*. **A.** Non-climbing habit. **B.** Climbing habit. **C.** Leaf. **D.** Inflorescence, whole and longitudinal section. From Acevedo-Rdgz., P. 2003, Bejucos y plantas trepadoras de Puerto Rico e Islas Vírgenes, Smithsonian Institution.

Philodendron scandens K. Koch & Sello in Klotzsch, App. Gen. Sp. Nov. 1853: 4. 1854. Type: A cultivated plant grown in Berlin (see G. S. Bunting, Gentes Herb. 10: 160. 1968, for discussion).

Philodendron micans Klotzsch ex K. Koch in Klotzsch, App. Gen. Sp. Nov. 1854: 7. 1854-55. Type: A plant from the Neotropics, brought into cultivation in Germany by Warszewicz.

Philodendron isertianum Schott, Prodr. Syst. Aroid. 242. 1860. *Philodendron scandens* subsp. *isertianum* (Schott) G. S. Bunting, Gentes Herb. 10: 165. 1968. Type: Martinique: *Isert s. n.* (holotype: C).

Philodendron oxycardium sensu Britton & P. Wilson, Bot. Porto Rico 5: 124. 1923, non Schott, 1856.

Figs. 5. C, D; 60. E

Vine to 10 m long, rooting at nodes; stem cylindrical, 1-2 cm diam., producing watery, caustic sap; cataphylls to 12 cm long, deciduous. Leaf blades 14-30 × 10-20 cm, ovate, coriaceous, the apex acuminate to cuspidate, the base cordate with non-overlapping sinuses, the margins slightly sinuate; petioles curved to straight, 10-15 cm long, nearly cylindrical, invaginate at base. Inflorescence axillary, solitary, ascending; peduncles 5-9 cm long, stout; spathe ca. 15 cm long, thickened, with convolute margins, nearly cylindrical, abaxially green to yellow at maturity, adaxially red to maroon; spadix nearly sessile, cylindrical, stout, whitish, slightly shorter than the spathe.

General distribution: Throughout tropical America.

Distribution in Puerto Rico and the Virgin Islands: Common in moist forests of low and middle elevations. Fajardo, Guaynabo, Maricao, Río Grande, and Toa Baja; St. John, St. Thomas, and Tortola.

Common names: Puerto Rico: *Bejuco de calabazón*, *Paisaje*.

Selected specimens examined: Puerto Rico: Fajardo: Hillside forest, *N.L. Britton & Shafer 1691* (US). Guaynabo: Bo. Sonadora, upper N slopes of Cerro Marquesa, *Proctor 43086* (SJ). Maricao: Indiera Fría, *N.L. Britton et al. 4489, 4544* (US). Maricao: Bo. Montoso, Río Prieto valley, *Breckon & Cedeño 4264* (US). Río Grande: Sierra de Luquillo, *Proctor 50420* (SJ). Toa Baja: Bo. Candelaria, E sector, Mogotes de Nevárez, *Proctor 45457* (SJ). St. John: Coral Bay Quarter; east side of Bordeaux Mountain, *Acevedo-Rdgz. 2610* (US, VINPS). St. Thomas: Estate Caret Bay, NW side of Crown Mountain, *Proctor & Pinto 40341* (SJ). Tortola: Pickate Ghut, W of Mt. Sage, *Proctor & Barwick 41982* (SJ). High Bush, *N.L. Britton & Shafer 826* (US).

4. Philodendron lingulatum (L.) K. Koch in Klotzsch, App. Gen. Sp. Nov. 1855: 2. 1855-56; *Arum lingulatum* L., Syst. Nat. ed. 10, 1251. 1759. Lectotype: Martinique. Plumier (Burman ed.), *Pl. Amer. t. 37. 1756*, designated by R.A. Howard, Fl. Lesser Antill. 3: 392. 1979.

Fig. 7. A

Herbaceous, glabrous root-climber, to 15 m long. Stems flexible, cylindrical, dark green, sulcate along one side, 05-2.5 cm in diam., producing scanty watery sap; bark papery, peeling off. Leaves distichous; blades simple, 13-42 × 7-28 cm, elliptic or ovate, subcoriaceous, semi-lustrous, the apex acute or abruptly acuminate, the base cordiform, sub-cordiform, cuneate or truncate, midvein wide, prominent on lower surface, secondary venation light green; petiole winged for most of its length, 12-48 cm long. Inflorescence axillary, solitary or in pairs. Spathe 10-23.5 × 2.9-5.3 cm, erect, the tube cylindrical-urceolate, abaxially dark green, adaxially greenish or whitish; spadix 8.7-21.2 cm long, whitish or cream, the pistillate portion 2.1-4.7 cm long, the sterile portion 0.6-1.3 cm long, and the staminate portion to 12 cm long.

General distribution: Hispaniola, Puerto Rico, Virgin Islands, and the Lesser Antilles.

Distribution in Puerto Rico and the Virgin Islands: In moist and rain forests along the Central mountain range and in karst limestone. Adjuntas, Arecibo, Ciales, Naguabo, and Río Grande; Tortola.

Common names: Puerto Rico: *Bejuco de calabazón, Calabazón cimarrón.*

Selected specimens examined: Puerto Rico: Ciales: along trail Camino de la Ceiba towards Quebrada del Pozo Azul, *Acevedo-Rdgz. & Vicens 11875* (UPRRP, US). Naguabo: Bo. de Maizales, *N.L. Britton & Shafer 2139* (US). Río Grande: El Yunque, *Sargent 559* (US); Sierra de Luquillo,

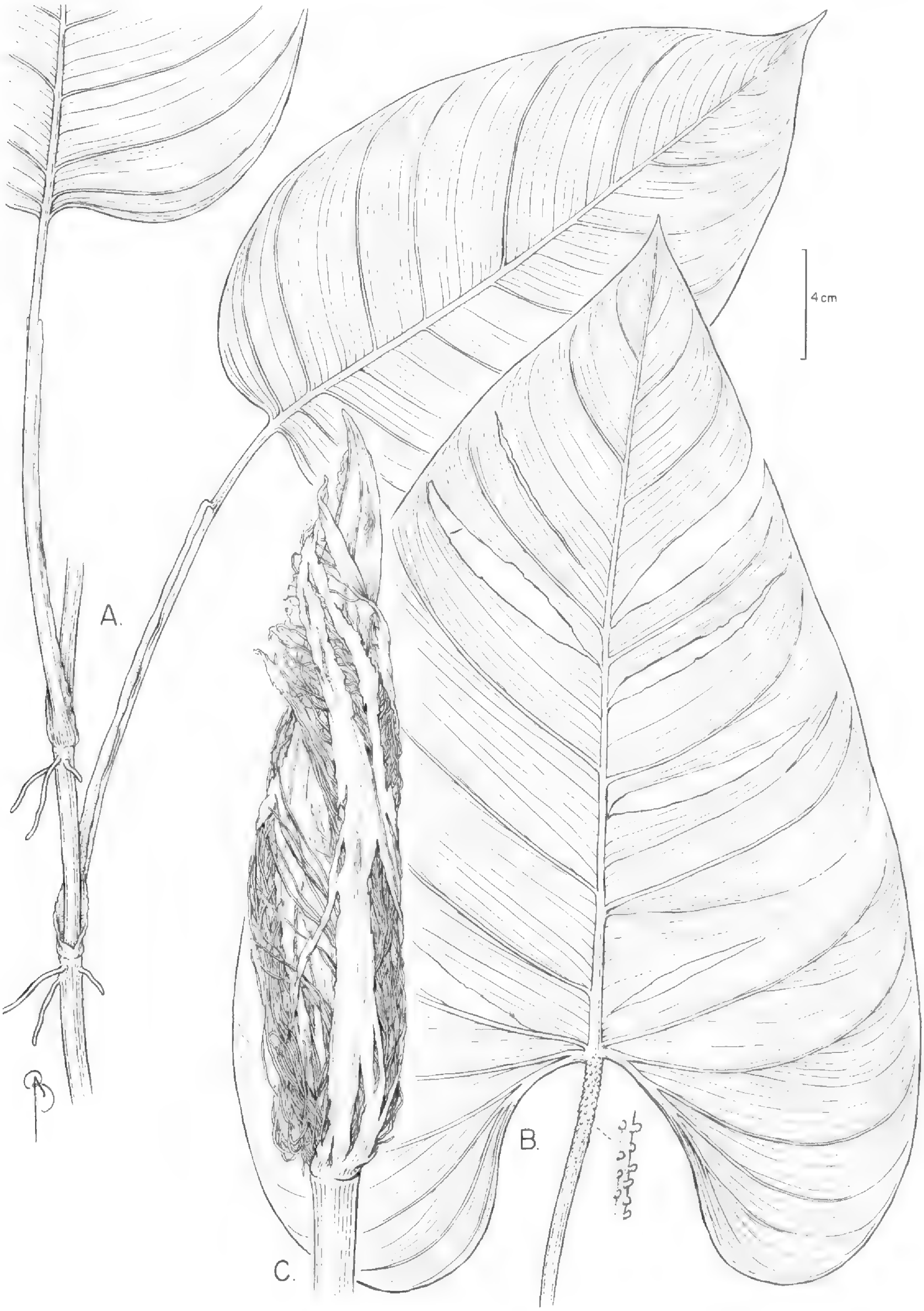


Fig. 7. A. *Philodendron lingulatum*, branch. **B-C.** *Philodendron ornatum*. **B.** Leaf, with detail of tubercles. **C.** Cataphylls. From Acevedo-Rdgz., P. 2003, Bejucos y plantas trepadoras de Puerto Rico e Islas Vírgenes, Smithsonian Institution.

Sintenis 1746 (US). TORTOLA: Pickate Ghut, W of Mt. Sage, *Proctor & Barwick 41981* (SJ).

5. Philodendron ornatum Schott, Oesterr. Bot. Wochenbl. 3: 378. 1853. Type: Unknown; representative material of this species and a good candidate for a lectotype of its name is Schott, *Icones Aroideae, t. 2453* (NYBG neg. 4116).

Fig. 7. B, C

Herbaceous, glabrous, root climber, 2-10 m long. Stems cylindrical, 2-2.5 cm in diam., smooth, producing scanty watery, caustic sap, the nodes with an annular scar. Cataphylls ca. 24 cm long, persistent. Leaves distichous; blades 32-60 × 24-46 cm, cordiform, chartaceous, glabrous, the apex acuminate, the base cordiform, the margins undulate, slightly revolute, upper surface dull, dark green, with sunken venation, lower surface light green, with prominent, reddish venation; petioles ascending, 14-42 cm long, ventrally compressed, distally pulvinate, the pulvinus tuberculate. Inflorescence axillary, in groups of 3, ascending; peduncles robust, 11-13 cm long. Spathe persistent, 16-18 cm long, fleshy, convolute, sub-infundibuliform, abaxially whitish with pinkish hue, adaxially burgundy, aristate at apex; spadix cylindrical-ellipsoid, robust, cream, almost as long as the spathe.

General distribution: Venezuela, Trinidad, Tobago, Surinam and Brazil. Introduced elsewhere.

Distribution in Puerto Rico: Naturalized along the lower part of the Guajataca Gorge.

Selected specimens examined: PUERTO RICO: Guajataca: Guajataca River, *Woodbury s.n.*(SJ). Quebradillas: Bo. Cacao, along E side of Río Guajataca at bottom of canyon, *Proctor 50206* (SJ). San Sebastián: Bo. Cibao, Río Guajataca gorge, *Proctor 47073* (SJ).

Cultivated Species

Philodendron bipinnatifidum Schott ex Endl. with large deeply pinnatifid leaves, is sometimes cultivated as an ornamental in Puerto Rico (Hato Rey, Pennock's Nursery, *Howard & Nevling 16928,* US); *Philodendron radiatum* Schott is also cultivated in Puerto Rico and has been collected as a persistent plant in abandoned fields (Utuado: Bo. Don Alonso, *Acevedo-Rdgz. 13411,* MAPR, US).

10. PISTIA

Pistia L., Sp. Pl. 963. 1753.

A unispecific genus, characterized by the following species.
TYPE: *Pistia stratiotes* L.

1. Pistia stratiotes L., Sp. Pl. 963. 1753. Lectotype: India. Rheede, *Hort. Malab. 11: t. 32. 1692*, designated by Suresh et al., Taxon 32: 127. 1983.

Pistia occidentalis Blume, Rumphia 1: 79. 1835. Lectotype: Madeira or Barbados. Sloane, *Voy. Jamaica 1: t. 2, f. 2. 1707,* here designated.

Fig. 8. A-C

Floating acaulescent, stoloniferous herb, forming large colonies. Leaves subsessile, in a rosette; blades 3-12 × 1.5-5 cm, cuneate, fleshy, with sunken parallel veins, impermeably pubescent, the apex rounded, truncate, usually notched, the base cuneate, the margins revolute. Inflorescence axillary, solitary, ascending; peduncles 5-7 mm long, slender; spathe 1.3-1.5 cm long, convolute and adnate to the spadix below, spreading above, whitish; spadix with a single pistillate flower at base, and with 2-8 staminate flowers above, shorter than the spathe. Flowers unisexual, the perianth wanting; stamens 2; ovary 1-locular, with numerous ovules, the style slender, the stigma penicillate. Fruit thin-walled, many-seeded. Seeds cylindrical, rugulose.

General distribution: A variable species found throughout tropical and subtropical regions.

Distribution in Puerto Rico and the Virgin Islands: In calm, temporary or permanent freshwater bodies such as rivers, lakes, ponds, cisterns or pools, sometimes cultivated. Arecibo,

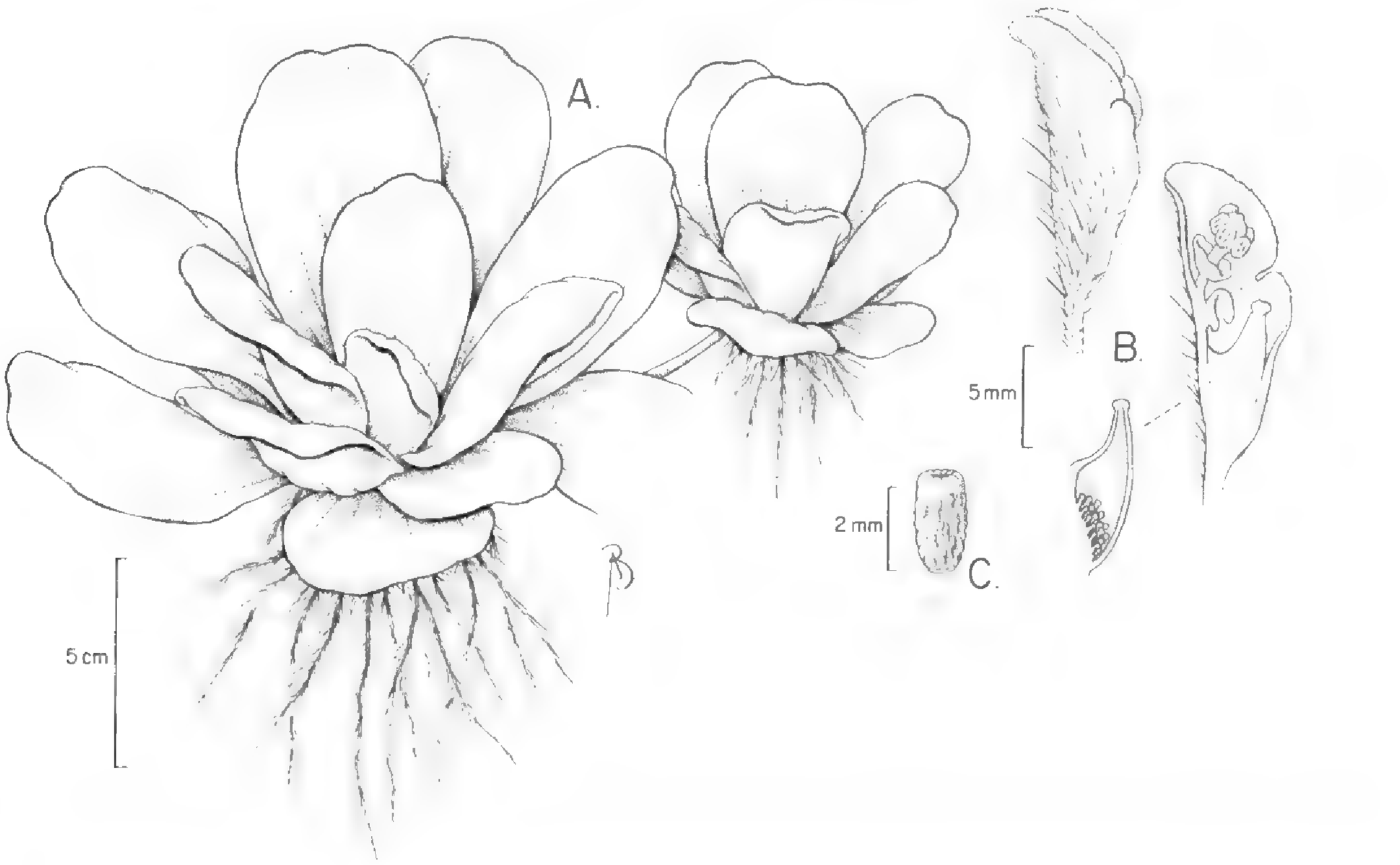


Fig. 8. A-C. *Pistia stratiotes*. **A.** Habit. **B.** Inflorescence, l.s. inflorescence showing staminate and pistillate flowers, and l.s. pistil showing ovules. **C.** Seed. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

Arroyo, Barceloneta, Cabo Rojo, Gurabo, Lajas, Loíza, Toa Alta, and Vega Alta, Vega Baja; St. John and St. Thomas.

Common names: Puerto Rico: *Lechuga de río, Lechuguilla de río.*

Selected specimens examined: PUERTO RICO: Arecibo: *E.G. Britton 5094* (US). Arroyo: Bo. Palmas, recently-established, temporary "lake" along road to Punta Guilarte, *Proctor et al. 46371* (SJ). Barceloneta: Bo. Garrochales, area of Caño Matos, *Proctor et al. 46144* (SJ). Cabo Rojo: *Sintenis 831* (US). Gurabo: Bo. Celada, Road 941 at W end of Río Gurabo bridge, *Proctor 42248* (SJ). Lajas: Bo. Sabana Yeguas, 0.3 km E of Road 116 and 1.2 km NE of Finca Juanita, *Proctor 46387* (SJ). Loíza: Bo. Torrecilla Alta, 0.2-1.2 km NNE of NE corner of Santa Barbara urbanization, *Proctor & Colón 50494* (SJ). Manatí: *Sintenis 6798* (US). Toa Alta: Bo. Contorno, Road 861, km 1.1, beside Río de la Plata below hwy bridge, *Proctor & Rivera 47441* (SJ). Vega Alta: between Dorado and Vega Baja, *Strong et al. 405* (GMUF). Vega Baja: Bo. Cibuco, along Río Cibuco ca. 1 km due SE of Cerro Cibuco, *Proctor et al. 45627* (SJ). ST. JOHN: Virgin Is. Natl. Park: just SE of Peter Peak, *Proctor & Pinto 40428* (SJ).

11. SPATHIPHYLLUM

Spathiphyllum Schott in Schott & Endicher, Melet. Bot. 22. 1832.

Terrestrial herbs; stems short, erect or creeping (seemingly acaulescent). Leaves in a loose rosette, simple, long-petiolate, the petiole geniculate at apex, with a long sheath. Inflorescence solitary, erect; peduncle shorter than the petiole; spathe herbaceous, not enclosing the spadix, ascending, marcescent, white, with distinct midvein and pinnate laterals; spadix sessile or short-stipitate, cylindrical, flowering from base to apex. Flowers bisexual, the perianth segments 4-6, free or connate into a short cup; stamens 4-6, free; ovary (2-) 3 (-4) -locular, with 2-8 axile ovules per locule, the style long, the stigma 2- or 3-lobed or sub-capitate or punctiform. Berry 1- to 8-seeded, green; seeds oblong, ellipsoid or ovoid. A genus of about 41 species of Central America, northern South America, and the eastern Malay archipelago.

TYPE: *Spathiphyllum lancifolium* (Jacq.) Schott (≡ *Dracontium lancifolium* Jacq. [as *lancaefolium*]).

Reference: Bunting, G. S. 1960. A revision of *Spathiphyllum* (Araceae). Mem. New York Bot. Gard. 10: 1-53.

1. Spathiphyllum wallisii Regel, Gartenflora 26: 323. 1877. Lectotype: Venezuela. Regel, *Gartenflora 26: t. 920. 1877*, here designated.

Glabrous, erect, terrestrial herb to 50 cm tall; rhizome very short. Leaves in a loose rosette; blades ascending, 12-22 × 2.3-4 cm, elliptic, chartaceous, midvein stout, prominent underneath, the secondaries slightly prominent, the apex long acuminate, the base attenuate, slightly asymmetrical, the margins entire, slightly wavy; petioles erect, nearly cylindrical, 13-25 cm long, narrowly winged throughout its extension. Inflorescence ascending; peduncles to 45 cm long; spathe ascending, green, leafy, oblong-lanceolate, ca. 11 cm long, acuminate at apex; spadix ascending, long-stipitate, ca. 3 cm long. Berries green, conical, ca. 4 mm long, produced throughout the spadix.

General distribution: Native of Venezuela and Colombia (?) introduced into the West Indies.

Distribution in Puerto Rico: Cultivated, an escaped population found in Adjuntas: Cordillera Central, Bo. Portugués ca. 0.9 km due SW of Alto de la Bandera, *Proctor 42130* (SJ).

12. SYNGONIUM

Syngonium Schott, Wiener Z. Kunst 1829: 780. 1829.

Epiphytes or hemi epiphytes, usually with long, root-climbing stems, producing milky sap. Leaves simple or variously divided, with 5-11 leaflets; petioles sheathed toward the base. Inflorescences 1-11 per axil; peduncles erect in flower, pendant in fruit; spathe fleshy, convolute, conspicuously constricted medially, the tube ellipsoid, the blade whitish to greenish, broadly spreading at anthesis; spadix much shorter than the spathe, erect, with pistillate flowers on basal portion. Flowers unisexual, the perianth wanting; stamens 3-4, united into a synandrium; ovary (1-) 2 (-3)-locular, with 1 (-2) ovules per locule, the stigma discoid or bilabiate. Fruit a 1-seeded berry, connate into an ovoid syncarp; seeds obovoid or ovoid. A genus of 33 species native to the Neotropics with most species in Costa Rica and Panama.

TYPE: *Syngonium auritum* (L.) Schott (≡ *Arum auritum* L.)

References: Birdsey, M. 1955. The morphology and taxonomy of the genus *Syngonium* (Araceae). Ph. D. dissertation, University of California, Berkeley. 382 pp. Croat, T. B. 1981. A revision of *Syngonium* (Araceae). Ann. Missouri Bot. Gard. 68: 565-651.

Key to the species of *Syngonium*

1. Leaves trisect, sub-5-pedatisect or rarely 5-pedatisect; leaflets 3(5), acute at apex ..... [*S. auritum*]
1. Leaves pedately divided; leaflets 3-11, acuminate at apex ..... 1. *S. podophyllum*

1. Syngonium podophyllum Schott, Bot. Zeitung (Berlin) 9: 85. 1851. Type: Unknown; representative material for this species and a good candidate for a lectotype of its name is Schott, *Icones Aroideae, t. 3224 (NYBG neg. 4329).*

Figs. 9. A-C; 60. F

Vine to 10 m long, rooting at nodes; stem cylindrical, glaucous, 1-2 cm diam., producing abundant milky sap. Leaves pedately divided; leaflets 3-11, united or free to base, coriaceous, the apex acuminate, the base variously auriculate, the margins sinuate, outermost leaflets smaller, the medial leaflets 16-38 × 6-17 cm, obovate, elliptic



Fig. 9. A-C. *Syngonium podophyllum*. **A.** Fertile branch. **B.** Leaf. **C.** Inflorescence with detail of synandrium. From Mori, S. et al. 1997. Vascular plants of central French Guiana. Mem. NYBG Vol. 76(1).

or lanceolate; petioles 15-60 cm long, nearly cylindrical, sheathed of their length. Inflorescences 4-11 per axil, ascending; peduncles 8-9 cm long, slender; spathe ca. 10 cm long, convolute into an ellipsoid tube at base, the blade cream-colored, concave, ephemeral; spadix whitish, sessile, cylindrical with a constriction between the pistillate and the staminate areas. Syncarp ovoid, red, reddish orange or yellow, 3-5.5 cm long.

General distribution: Native to Mexico but grown as an ornamental and naturalized throughout the Caribbean. Also, now throughout tropical America and Florida (U.S.A.).

Distribution in Puerto Rico and the Virgin Islands: Becoming common throughout moist disturbed habitats. Ceiba, Ciales, Luquillo, Río Grande, Utuado, Vega Baja, and Yabucoa; St. John and St. Thomas.

Common name: Puerto Rico: *Malanga trepadora.*

Selected specimens examined: PUERTO RICO: Ceiba: Bo. Chupacallos, former quarry area along Quebrada Aguas Claras, 1.45 km due WSW of plaza in Ceiba town center, *Proctor & Colón 50190* (SJ). Ciales: Bo. Frontón, Road 140, km 49, *Proctor et al. 51149* (SJ). Luquillo: Bo. Mameyes I, Fortuna area, E side of the Río Mameyes near its mouth, *Proctor & Torres 49244* (SJ). Río Grande: Bo. Herreras: just N of Caño San Luis c. 0.2 km W of Road 187, *Proctor & Morris 45994* (SJ). Utuado: Bo. Don Alonso, *Acevedo-Rdgz. et al. 7122* (UPRRP, US).Vega Baja: Bo. Cibuco, border of mangrove thicket 1.2 km due ENE of Cerro Cibuco, *Proctor et al. 45631* (SJ). Yabucoa: Bo. Calabazas, hwy 3, ca. Km 101.5, *Proctor & Rivera 46943* (SJ). ST. JOHN: Cruz Bay Quarter; Susannaberg, *Acevedo-Rdgz. & Angell 4061* (MO, NY, UPR, US).

Cultivated Species

Syngonium auritum (L.) Schott was reported by Liogier and Martorell (Fl. Puerto Rico, Syst. Synop. 2000) as occurring in shady forests at low elevations. However, we have not been able to locate a specimen to verify this record, nor have we collected it in naturalized conditions. The species has been collected however, persisting on an abandoned farm in Utuado: Bo. Don Alonso, *Acevedo-Rdgz. 13410* (MAPR, US).

13. XANTHOSOMA

Xanthosoma Schott in Schott & Endicher, Melet. Bot. 19. 1832.

Small to large herbs, the stems subterranean and tuberous with smaller tubers or stolons, or epigeal and massive; producing milky sap. Leaves simple or dissected, several in a rosette in acaulescent species or terminal in arborescent species, cordate or sagittate at base, secondary veins forming a poorly organized collective vein between the primary lateral veins; petiole long, with distinct, elongated sheath. Inflorescence pedunculate, 1 to many per node. Spathe erect, strongly constricted, the basal area forming a convolute, tube that surrounds the spadix, the marcescent and deciduous blade longer than the tube, boat-shaped, oblong to oblong-lanceolate, gaping and erect or sometimes reflexed; spadix erect, shorter than the spathe, with a basal pistillate zone, separated from the distal staminate zone by a narrower zone of staminate sterile flowers. Flowers unisexual, lacking perianth; stamens 4-6, connate into a truncate synandrium; ovary ovoid, (1)2-4-locular, with numerous parietal to basally axial ovules, the style broader than the ovary, coherent or weakly connate with those of neighboring flowers, the stigma sub-capitate or 2-lobed. Berry cylindrical, white or orange, many-seeded; seeds ovoid, costate. A genus of about 57 species native to tropical America, including the West Indies. Several species cultivated throughout the tropics for their edible starchy tubers and leaves.

LECTOTYPE: *Xanthosoma sagittifolium* (L.) Schott (≡ *Arum sagittifolium* L. [as *sagittaefolium*]), designated by Nicolson, Taxon 24: 345-347. 1975.

Note: As commonly happens with cultivated species, the taxonomy of *Xanthosoma* is notoriously difficult. The collections available are inadequate as the plants do not preserve well and usually are not representative, even of the individual collected. We are basically following the treatments of previous workers in the region, most of which stem from the work of Engler & Krause in 1920. A revision of this important genus is badly needed.

Key to the species of *Xanthosoma*

1. Leaves entire, sagittate or nearly lanceolate, without lateral lobes 2
   2. Petiole's invagination with revolute margins; petioles and lower surface of leaf purplish tinged; basal lobes of the leaf subtriangular ..... 5. *X. violaceum*
   2. Petiole's invagination with involute or straight margins; petioles and lower surface of leaf light green; basal lobes of the leaf sub-rhomboid, obtuse 3
      3. Leaf with 8-9 basicopic secondary veins on basal lobes, these forming a 75-80° with the primary vein; spathe with green tube and abaxially white blade .....3. *X. sagittifolium*
      3. Leaf with ca. 12 basicopic secondary veins on basal lobes, these forming a 45-60° with the primary vein; spathe with maroon tube and abaxially rosy blade ..... 4. *X. undipes*
1. Leaves pedately dissected or with two large lateral lobes 4
   4. Leaves with two divergent basal lobes ..... 1. *X. brasiliense*
   4. Leaves pedately dissected into 5-12 segments ..... 2. *X. helleborifolium*

1. Xanthosoma brasiliense (Desf.) Engl., Pflanzenr. IV. 23E (Heft 71): 58. 1920; *Caladium brasiliense* Desf., Tabl. Ecole Bot., ed. 3, 386. 1829. Type: Not known, a cultivated plant grown in Paris, (FI?).

Acontias hastifolius Schott in Schott & Endlicher, Melet. Bot. 19. 1832. Type: Unknown; representative material for this species and a good candidate for a lectotype of its name is Schott, *Icones Aroideae, t. 3450 (NYBG Neg. 4295).*

Acontias cubensis sensu Bello, Anales Soc. Esp. Hist. Nat. 12: 115. 1883, non Schott, 1859.

Xanthosoma hastatum Eggers, Fl. St. Croix 99. 1879*. Type: St. Croix, U.S. Virgin Islands. *Eggers* ? (C?).

Glabrous, erect, acaulescent herb, with slender base. Leaves 1-3; blades nearly horizontal, 21-40 × 11-25 cm, hastate, chartaceous, upper surface green, lower surface pruinose, the apex obtuse or less often shortly acuminate, the basal lobes divergent, oblong-lanceolate, 8-25 cm long, the margins undulate; petioles erect, 22-45 cm long, green, terete except for the invaginate lower 1/3. Inflorescences axillary, ascending; peduncles to 32 cm long; spathe coriaceous, ca. 28 cm long, the tube 8-10 cm long, green, oblong-ovoid, the blade elliptic to lanceolate, erect, concave, abaxially greenish, with network of veins, acuminate at apex; spadix stipitate, shorter than the spathe, the pistillate zone ca. 3 cm long, conical or subconical, the sterile staminate zone ca. 4 cm long, the fertile staminate zone ca. 12 cm long.

General distribution: Central and South America, Cuba, Puerto Rico, Virgin Islands and the Lesser Antilles.

Distribution in Puerto Rico and the Virigin Islands: Marshy grounds, and disturbed, moist edges of forests. Arecibo, Coamo, Mayagüez, San Juan, and Toa Baja; reported by Eggers (1879) as naturalized on all islands of the Virgin Islands, not collected there in recent years.

Note: * Questionably validly published, i.e., not labelled as "n. sp."

Selected specimens examined: Puerto Rico: Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10685* (US). Coamo: *Sintenis 3222* (US). Mayagüez: *Cowell 643, 645* (US). San Juan: Río Piedras, Stevenson 2496 (US). Toa Baja: Bo. Candelaria, 0.4-0.7 km WSW of Pico Nevárez, *Proctor 45337* (SJ-2); *45337a* (US).

2. Xanthosoma helleborifolium (Jacq.) Schott, Oesterr. Bot. Z. 15: 33. 1865; *Arum helleborifolium* Jacq., Collectanea 3: 217. 1789; *Acontias helleborifolius* (Jacq.) Schott in Schott & Endicher, Melet. Bot. 19. 1832. Lectotype: Venezuela. Jacq., *Ic. Pl. Rar. pl. 613*. 1792, here designated.

Xanthosoma hastifolium K. Koch, App. Gen. Sp. Nov. 1854: 2. 1854-55. Type: Unknown, a cultivated plant grown in Berlin.

Xanthosoma angustisectum Engl., Arac. Exsicc. et illustr. 88. 1884; *Xanthosoma helleborifolium* var. *angustisectum* (Engl.) Engl., Pflanzenr. IV. 23E (Heft 71): 61. 1920. Type: Puerto Rico. *Grosourdy, s. n.* (holotype: P, photo at US)

Glabrous, erect, acaulescent herb, with swollen base. Leaves 1-2; blades 20-90 × 15-35 cm, in outline, pedately dissected into 5-12 segments, chartaceous, upper surface green, lower surface pruinose, the segments oblong to oblanceolate, acute or acuminate at apex, the margins undulate; petioles erect, 22-50 cm long, green with dark green banding, invaginate on lower ¼. Inflorescences axillary, ascending, solitary; peduncles 10-15 cm long; spathe chartaceous, 11-14 cm long, the tube 4-5.5 cm long, green, ellipsoid, the blade elliptic to lanceolate, erect, concave, yellowish green, acuminate at apex; spadix shortly stipitate, slightly shorter than the spathe, the pistillate zone cylindrical, the sterile staminate zone conical, the fertile staminate zone ellipsoid.

General distribution: Central and South America, Puerto Rico and the Lesser Antilles.

Distribution in Puerto Rico: Naturalized, known from Añasco, Mayagüez, and San Juan.

Selected specimens examined: Puerto Rico: San Juan: Río Piedras, *Stevenson 2496* (US).

3. Xanthosoma sagittifolium (L.) Schott in Schott & Endicher, Melet. Bot. 19. 1832; *Arum sagittifolium* L., Sp. Pl. 966. 1753. Lectotype: Jamaica: Sloane, *Voy. Jamaica 1: t. 106, f. 2. 1707,* designated by Nicolson in A.C. Sm., Fl. Vit. Nov. 1: 459. 1979.

Xanthosoma atrovirens K. Koch & Bouché, App. Gen. Sp. Nov. 1854: 3. 1854-55. Lectotype: Jamaica: Sloane, *Voy. Jamaica 1: t. 106, f. 2. 1707,* here designated.

Fig. 59. G, H

Glabrous, erect, herb to 2 m tall, acaulescent when young, mature plants with a thick, erect, fleshy stem to 1 m long, these with numerous leaf scars and sometimes with aerial roots, the base enlarged, ovoid, producing lateral, elongated subterranean, edible tubers. Leaves several, nearly in a rosette in acaulescent plants, or in a distal crown in mature plants; blades horizontal to slightly nodding, with the posterior lobes ascending, 40-100 × 40-70 cm, simple, sagittate-ovate or subcordate, chartaceous, upper surface dark green with light green primary and secondary veins, lower surface light green, pruinose, with dark green venation, the apex obtuse, ending in an acute point, the base cordate with non-overlapping lobes, the lowest pair of secondary veins surrounded by marginal tissue at their insertion with the petiole, the margins undulate; petioles erect, 1-1.5 m long, green, invaginate on lower ⅔, with straight, wavy or sometimes involute margins. Inflorescences 1-3, axillary, ascending; peduncles to 20 cm long; spathe chartaceous, 13-15 cm long, the tube 6-7 cm long, grayish green, oblong-ovoid, the blade elliptic, erect, concave, adaxially cream to white, shortly acuminate at apex; spadix slightly shorter than the spathe, the pistillate zone cylindrical, the sterile staminate zone conical, pinkish, the fertile staminate zone elongated, ellipsoid, cream.

General distribution: Native to the Neotropics, cultivated throughout the tropics for its edible starchy tubers.

Distribution in Puerto Rico: Cultivated and naturalized in moist or wet, disturbed vegetations. Arecibo, Salinas, and Utuado. Cultivated in St. John and St. Thomas.

Common names: Puerto Rico: *Yautía, Yautía blanca, Yautía amarilla.*

Selected specimens examined: Puerto Rico: Arecibo: Río Abajo State Forest, along Juan Ruiz trail, *Acevedo-Rdgz. 10684* (US); Along Rd. 123, *Acevedo-Rdgz. 13414* (US). Salinas: Bo. Lapa, vicinity of Las Tetas de Cayey, *Proctor 45303* (SJ).

4. Xanthosoma undipes (K. Koch) K. Koch, Bonplandia 4: 3. 1856; *Alocasia undipes* K. Koch, App. Gen. Sp. Nov. 1854: 5. 1854-55. Type: Cultivated material grown in Berlin and Potsdam (Sanssouci) [probably destroyed].

Xanthosoma jacquinii sensu Schott, Syn. Aroid. 57. 1856, non Schott in Schott & Endicher, Melet. Bot. 19. 1832. *nom. illeg.*, non Kunth 1841.

Figs. 59. I; 60. A, B, D

Glabrous, erect herb to 2 m tall, producing milky sap, acaulescent when young, mature plants with a thick, decumbent, starchy stem 1-1.5 m long, with numerous leaf scars and aerial roots at the base. Leaves several, in a distal crown in mature plants; blades horizontal to nodding, with the posterior lobes ascending, 40-70 × 30-50 cm, simple, cordate-sagittate, chartaceous, upper surface dark green, lower surface grayish green, pruinose, the apex widely obtuse, mucronate, the base cordate with wide sinus, the lowest pair of secondary veins naked (not surrounded by

marginal tissue) at their insertion with the petiole, the margins undulate; petioles erect, 45-100 cm long, green, invaginate on lower ⅓-½, with involute margins. Inflorescences axillary, in groups of 3, ascending; peduncles to 30 cm long; spathe 25-31 cm long, the tube ellipsoid, 11-13 cm long, thickened, abaxially and adaxially burgundy, the blade ephemeral, ovate to elliptic, chartaceous, erect, concave, adaxially whitish, abaxially deep-pink, acuminate at apex; spadix shorter than the spathe, the pistillate zone (basal), yellowish, 3-4 cm long, conical, the sterile zone pink, fertile staminate zone (distal) light pink, ellipsoid, 12-14 cm long. Berries not collected in Puerto Rico.

General distribution: Native to tropical America. Known from Central America, South America, Puerto Rico and the Lesser Antilles

Distribution in Puerto Rico: In moist disturbed habitats. Arecibo, Florida, Isabela, Luquillo, Mayagüez, Ponce, Quebradillas, Río Grande, and Salinas.

Common names: Puerto Rico: *Yautía rascana, Yautía de palma.*

Selected specimens examined: Puerto Rico: Arecibo: Bo. Río Arriba, just E of Río Abajo State Forest, *Proctor et al. 49497* (SJ-3); Río Arriba, ca. 2 km N of Dos Bocas lake, along Rd. 123 (old road 10), *Acevedo-Rdgz. 13413* (US). Isabela: Bo. Coto, Highway 2, km 105.3, *Proctor 45967* (SJ). Quebradillas: Bo. Cacao, along E side of Río Guajataca, *Proctor 50209* (SJ-2). Río Grande: Guzmán Arriba, *Acevedo-Rdgz. 13752* (US). Salinas: Bo. Lapa, vicinity of Las Tetas de Cayey, *Proctor 44613* (SJ).

5. Xanthosoma violaceum Schott, Oesterr. Bot. Wochenbl. 3: 370. 1853. Type: Unknown; representative material of this species and a good candidate for a lectotype of its name is Schott, *Icones Aroideae, t. 3432 (NYBG neg. 4288)*. Possibly from cultivated material collected by Schott in Brazil (1817-1821).

Arum nigrum Vell., Fl. Flumin. 9. t. 107. 1831 ["1827"], *nom. nud.**; Arq. Mus. Nac. Rio de Janeiro 5: 386. 1881, non Schott 1857; *Xanthosoma nigrum* Stellfeld., Tribuna Farm. 12: 201. 1944. Type: Brazil. Vellozo, *Fl. Flumin. 9, t. 107. 1827 [1831].*

Fig. 60. C

Glabrous herb, acaulescent when young, developing a thick, starchy caudex (> 1 m long) with age. Leaves few, in a loose rosette when acaulescent or in a distal crown in mature plants; blades pointing downward or less often horizontal, 20-65 × 15-40 cm, simple, sagittate-ovate, chartaceous, upper surface green, lower surface purple-tinged, especially along veins, the apex obtuse, with short acumen, the base cordate with non-overlapping or slightly overlapping sinuses, the lowest pair of secondary veins surrounded by marginal tissue at their insertion with the petiole, the margins undulate; petioles erect, 30-100 cm long, purple-black, invaginate on lower ½, with revolute margins. Inflorescences axillary, ascending, 6-8 clustered; peduncles to 20 cm long; spathe chartaceous, 30-40 cm long, the tube 5-15 cm long, abaxially greenish, adaxially yellowish, ellipsoid-ovoid, the blade ovate or oblong-lanceolate, erect, concave, adaxially yellowish to whitish abaxially, yellowish to yellowish brown, shortly acuminate at apex; spadix slightly shorter than the spathe.

General distribution: Central America, South America, and the West Indies.

Distribution in Puerto Rico: Cultivated and naturalized. In moist disturbed habitats. Adjuntas, Arecibo, Luquillo, and Río Grande.

Common names: Puerto Rico: *Yautía morada, Yautía lila.*

Note: * When volume 9 was published in 1831, it did not contain plant descriptions, and because figure 107, representing *Arum nigrum* did not contain any analytical sub-figures, the name is invalidly published (art. 44. 1 ICBN).

Selected specimens examined: Puerto Rico: Arecibo: Bo. Sabana Hoyos, *Acevedo-Rdgz. et al. 13370* (MAPR, UPRRP, US). Río Grande: Sierra de Luquillo, *Sintenis 1587* (US); Guzmán Arriba, *Acevedo-Rdgz. 13753* (US); Luquillo Mts., along service road to El Yunque Peak, *Acevedo-Rdgz. 14453* (UPRRP, US).

Cultivated Species

Xanthosoma caracu K. Koch & Bouché, known as *Rollisa blanca* or *Manola*, was reported as cultivated in Puerto Rico by Engler & Krause (1920).

Cultivated Genera

The calla lily (*Zantedeschia aetiopica* (L.) Link) is cultivated in the central mountains of Puerto Rico for cut flowers. This operation exists only on a very small scale. *Aglaonema commutatum* Schott, *Aglaonema pictum* Kunth, and *Calla palustris* L. were cited by Martorell et al. (1981) as cultivated in Puerto Rico.

Excluded Genus

Montrichardia arborescens (L.) Schott, has been treated as occurring in Puerto Rico by Urban (Symb. Antill. 4: 133-134. 1903) and by Britton & P. Wilson (Bot. Porto Rico 5: 125. 1923) based on a report by Bello (Anales Soc. Esp. Hist. Nat. 12: 115. 1883). More recently it has been reported by Liogier and Martorell (Fl. Puerto Rico, Syst. Synop., 2000) as occurring along borders of the Río Blanco in Naguabo. However, based on the fact that we have not been able to locate any collections of this species for Puerto Rico, and that the species is otherwise known from South America north only to Guadeloupe, we conclude that the species does not occur in our area. Bello's record was apparently a misidentification of another shrubby Araceae occurring in Puerto Rico. The fact that he provided the common name *Yautía madera* for this species in Puerto Rico suggests that whatever he identified as such may have been relatively common. In studying Agustin Stahl's unpublished watercolors, we came across an illustration of *Philodendron giganteum* bearing the common name *Yautia madera*. The two men knew each other, and it is quite possible that Bello's *Montrichardia* referred to Stahl's illustration of *Yautia madera*, especially since these species are superficially similar.

Family 2. **LEMNACEAE** *Duckweed Family*

Lemnaceae Gray, Nat. Arr. Brit. Pl. 2: 729. 1821, *nom. conserv.*

by G. R. Proctor

Monoecious or rarely dioecious, small to minute aquatic, leafless, annual herbs, floating on or submerged in fresh to slightly brackish water. Vegetative part consisting of a thallus, either solitary or connected in small clusters, symmetric or asymmetric, flat or minutely hemispheric, varying in outline from reniform, round, elliptic, oblong or lanceolate, usually green but red or brown pigments sometimes also present; roots several, one per frond, or wanting. Vegetative propagation frequent from budding pouches at margins of frond. Flowers also produced in small pouches or cavities, 1 or 2 per frond; inflorescence with or without a spathe, otherwise consisting of a pistillate and 1 or 2 staminate flowers. Staminate flower consisting of a single stamen, the anther 1- or 2-locular. Pistillate flower consisting of a sessile globular, 1-locular ovary with a short apical style. Ovules 1-4. Fruit a 1- to 4-seeded utricle; seeds ribbed or smooth. A small cosmopolitan family of 5 genera and 32 species. These are the world's smallest flowering plants.

TYPE: *Lemna* L.

Reference: Landolt, E. 1986. The family Lemnaceae -a monographic study. Veröff. Geobot. Inst. ETH Stiftung Rübel Zürich 71: 7-566. Les, D.H. & D.J. Crawford. 1999. Landoltia (Lemnaceae), a new genus of Duckweeds. Taxon. 9: 530-533.

Key to the genera

1. Roots present 2
   2. Each thallus with a single root ..... 1. *Lemna*
   2. Each thallus with several roots (2-21) ..... 2. *Spirodela*
1. Roots absent 3

3. Thallus floating, very minute, hemispheric or globular ..... 3. *Wolffia*
3. Plants submerged, flat, membranous ..... 4. *Wolffiella*

1. LEMNA

Lemna L., Sp. Pl. 970. 1753, *nom. conserv.*

Plants floating or submerged (if submerged, rising to the surface during flowering periods); roots 1 per thallus or rarely absent. Thallus solitary or in small, connected groups of 2-10, symmetric or slightly asymmetric, round, elliptic, obovate or lanceolate, flat or slightly swollen beneath, containing raphides, the margins entire or rarely denticulate; stomata on upper surface; nerves usually 1-3; budding pouch opening at margin of thallus, rarely slightly dorsal or ventral. Seeds longitudinally ribbed, rarely smooth. A cosmopolitan genus of 13 species.

TYPE: *Lemna minor* L., Sp. Pl. 970. 1753, *typ. conserv.*

Key to the species of *Lemna*

1. Thallus 3-nerved, broadly oblong, obovate or suborbicular, not much longer than broad ..... 1 . *L. aequinoctialis*
1. Thallus 1-nerved or apparently nerveless, oblong (often narrowly so) usually at least twice as long as broad when mature 2
   2. Thallus mostly 1-1.5 mm long, equilateral, always floating on water surface; epidermis often with minute, linear, whitish cystoliths ..... 2. *L. minuscula*
   2. Thallus mostly 2-4.5 mm long, inequilateral and often subfalcate, floating or submerged; epidermis lacking evident cystoliths ..... 3. *L. valdiviana*

1. Lemna aequinoctialis Welw., Ann. Cons. Ultramar. (Portugal), Parte Não Off. ser. 1, 55: 578. 1859 ["1858"] Type: Angola; Luanda. *Welwitsch 206* (lectotype: STU; isolectotypes: BM, G, K, ZT), designated by Landolt, Veröff. Geobot. Inst. ETH Stiftung Rübel Zürich 71: 445. 1986.

Lemna perpusilla var. *trinervis* Austin ex A. Gray, Manual ed. 5, 479. 1867; *Lemna trinervis* (A. Gray) Small, Fl. s.e. U.S. 230. 1903. Type: United States; Pennsylvania. *C. F. Austin s.n.* (NY).

Lemna minor sensu Griseb., 1864, non L., 1753.

Lemna perpusilla sensu Britton & P. Wilson, 1923, non Torr., 1843.

Fig. 10. A, B

Thallus solitary or 2-5 connected, mostly 1.5-3.3 × 0.5-2.5 mm; upper surface smooth except for a small papule near the tip and another at the node; nerves usually 3 but sometimes indistinct. Ovary with a single ovule; seed oblong to ovoid, 0.45-0.8 mm long, brownish, with 8-26 longitudinal ribs.

General distribution: A pantropical species extending both north and south into temperate areas.

Distribution in Puerto Rico and the Virgin Islands: Floating in quiet or sheltered fresh water at low elevations (0-84 m). Recorded from Aguadilla, Cabo Rojo, Caguas, Cataño, Coamo, Dorado, Guánica, Humacao, Juncos, Lajas, Quebradillas, Salinas, San Juan, and Vega Baja; St. Croix, St. John, Tortola, and Virgin Gorda.

Common names: Puerto Rico: *Lentejilla de agua, Yerba de pato.*

Selected specimens examined: PUERTO RICO: Cataño: Bo. Palmas, Ciénaga de las Cucharillas, *Proctor & Rivera 46204* (US). Dorado: *Liogier & Liogier 29856* (UPR). Guánica: *N.L. Britton & Shafer 1886* (US). San Juan: Bo. Puerto Nuevo, wetlands along Ave. Kennedy near crossing of Río Puerto Nuevo, *Proctor 46207* (US); Río Piedras, *Liogier 37226* (UPR). Vega Baja: sea level, *Liogier 31988* (UPR). ST. CROIX: Crequis Dam Resevoir, *Fosberg 53950* (US); South River, in upper estuary, *Fosberg 59042* (US); Estate Mt. Pleasant (Colquehoun), Rd 72, Cruzan Gardens, *Proctor et al. 44992* (US). ST. JOHN: Coral Bay Quarter, Road 107, *Acevedo-Rdgz. et al. 4022* (US); Reef Bay Quarter, Lameshur, *Acevedo-Rdgz. 5260* (US).

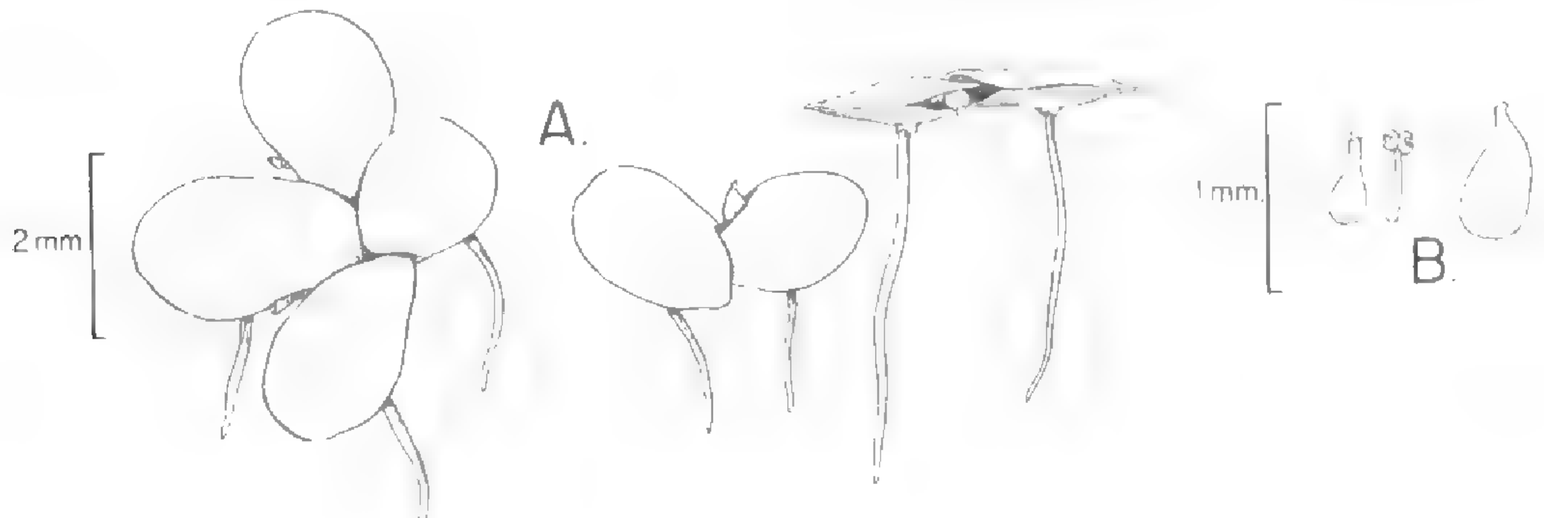


Fig. 10. A, B. *Lemna aequinoctialis*. **A.** Habit (colony), top and lateral views. **B.** Pistillate and staminate flower and utricle. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

2. Lemna minuscula Herter, Revista Sudamer. Bot. 8: 185. 1954. Type: Chile; Santiago. *Philippi 5* (lectotype: STU; isolectotypes: BM, G, GOET, K, LE, MEL, MO, S, SGO, UPS, ZT), designated by Landolt, Veröff. Geobot. Inst. ETH Stiftung Rübel Zürich 71: 447. 1986.

Lemna minuta Kunth in Humb., Bonpl., & Kunth, Nov. Gen. Sp. 1 [quarto ed.]: 372. 1816, *nom. nud.*

Lemna perpusilla sensu Liogier & Martorell, 1982, non Torr., 1843.

Thallus solitary or sometimes 2-4 cohering, mostly 0.8-1.5 × 0.5-1.5 mm, up to 2 times longer than wide, rounded at both ends. Nerves indistinct and relatively short. Plants seldom flowering or fruiting; seeds ovoid, 0.4-0.55 mm long, with 12-15 longitudinal ribs.

General distribution: Indigenous primarily in the warm-temperate parts of North and South America and at rather high elevations throughout the Andes, very rare in the West Indies; introduced in western Europe and Japan.

Distribution in Puerto Rico and the Virgin Islands: Rare, sea level to 300 m, sometimes in artificial pools. Recorded for Barceloneta and Cayey; St. Thomas.

Selected specimens examined: Puerto Rico: Barceloneta: Bo. Garrochales, Caño Matos, *Proctor 46146* (SJ). Cayey: *Liogier et al. 33219* (UPR). St. Thomas: Estate Neltjberg, vicinity of Ruy Point, overlooking Neltjberg Bay, *Proctor et al. 45290* (SJ, US).

3. Lemna valdiviana Phil., Linnaea 33: 239. 1864. Type: Chile; Valdivia. *Philippi 1*, (lectotype: STU; isolectotype: MO), designated by Landolt, Veröff. Geobot. Inst. ETH Stiftung Rübel Zürich 71: 447. 1986.

Thallus floating or frequently submerged, often clustering in groups of 6-20, mostly 2.5-3.5 × 1.3-3 mm, 1.3-3 times longer than wide, often somewhat pointed at apex; nerve usually rather prominent and relatively long (extending at least 76% of the distance between node and thallus tip). Occasionally flowering and fruiting; seeds ovoid, 0.6-0.8 mm long, with 16-29 longitudinal ribs.

General distribution: Confined to the Western Hemisphere, where it occurs in tropical and warm-temperate areas.

Distribution in Puerto Rico: Very rare, confined to the north side of Puerto Rico at or near sea level. Recorded for Barceloneta, San Juan, and Vega Baja.

Selected specimens examined: Puerto Rico: Barceloneta: Bo. Garrochales, Caño Matos, *Proctor 46147* (SJ). San Juan: *Hioram s. n.* (GH, cited by Landolt).

2. SPIRODELA

Spirodela Schleid., Linnaea 13: 391. 1839.

Thallus lanceolate, ovate, or suborbicular, always floating on water surface, solitary or several

cohering in a rosette-like group; nerves mostly 5-16 per thallus; tissue containing anthocyanin pigments (visible in dead thallus as brown dots) and thin crystals in bundles (raphides). Roots multiple (2-21) per thallus. Ovary with 1-5 ovules. A cosmopolitan genus of 3 species.

TYPE: *Spirodela polyrhiza* (L.) Schleid. (≡ *Lemna polyrhiza* L.)

Key to the species of *Spirodela*

1. Thallus 1-1.5 times longer than broad, the upper surface smooth; roots 7-21 per thallus ..... 1. *S. polyrhiza*
1. Thallus 1.5-2 times longer than broad, the upper surface with a median line of small papules; roots mostly 2-7 per thallus ..... 2. *S. punctata*

1. Spirodela polyrhiza (L.) Schleid., Linnaea 13: 392. 1839; *Lemna polyrhiza* L., Sp. Pl. 970. 1753; *Lenticula polyrhiza* (L.) Lam., Fl. Franç. 2: 189. 1779 ["1778"]; *Thelmatophace polyrhiza* (L.) Godr., Fl. Lorr. 3. 1843. Neotype: Canada; Vancouver Is. *Macoun 88277* (US!; isoneotypes: C, GH, NY), here designated.

Thallus solitary or in rosette-like clusters, rounded or sometimes pointed at tip, 1.5-10 × 1.5-5 mm, sometimes with a red spot above the node. Flowers and fruits rarely produced. Ovary with 1-2 ovules. Fruit 1-1.5 mm long and wide, with winged edges near the top; seeds 1 or rarely 2, 0.7-1 mm long, with 12-20 distinct longitudinal ribs.

General distribution: A widely distributed species common in North America and Europe, frequent to common in eastern and southern Asia, northern and eastern Australia, and eastern Africa, but virtually absent from South America.

Distribution in Puerto Rico and the Virgin Islands: Uncommon to rare, mostly at or near sea level, recorded from Aguada, Coamo, Guayanilla, Manatí, and Vega Baja; St. Croix.

Note: Landolt (1986) was unable to locate the type of *Spirodela polyrhiza,* although he stated that the identity of the species is unmistakable. Because he failed to designate a type, we propose as neotype a specimen that was cited in his monograph and is represented in several herbaria.

Selected specimens examined: PUERTO RICO: Coamo: Coamo River, *N.L. Britton et al. 5805* (US); Coamo, *Sintenis 3189* (US). Guayanilla: *N.L. Britton & Shafer 1795* (US). Manatí: Río Arriba Saliente, *Sintenis 6656* (US). Vega Baja: Bo. Cabo Caribe, 1 km due SE of Escuela Cabo Caribe, *Proctor et al. 45624* (US). ST. CROIX: Estate Mt. Pleasant (Colquehoun), Rd 72, Cruzan Gardens, *Proctor et al. 44993* (US). Cruzan Gardens, Colquehorn, *Fosberg 58961* (US).

2. Spirodela punctata (G. Mey.) C. H. Thomps., Rep. (Annual) Missouri Bot. Gard. 9: 28. 1898; *Lemna punctata* G. Mey., Prim. Fl. Esseq. 262. 1818; *Landoltia punctata* (G. Mey.) D.H. Les & D.J. Crawford, Novon 9: 532. 1999. Neotype: Chile; Tierra de Fuego Is. *Wilkes Expedition s.n.,* 1838 (US!; isoneotypes: BM, GH, KANU, MO), designated by Les & Crawford, Novon 9: 532. 1999.

Thallus solitary or in small clusters, ovate to lanceolate, often somewhat pointed, 1.5-8 × 1-5 mm, 1.5-2 times longer than wide. Plants occasionally flowering and fruiting. Ovary with 1-2 ovules. Fruit 0.8-1 mm long, winged; seeds usually 1, ca. 0.8 mm long, with 10-15 longitudinal ribs.

General distribution: Widely but sporadically distributed, most common in California, S. E. United States, S. E. Africa, S. E. Asia, Japan, and E. and S. E. Australia. It appears to be absent from Europe, northern Asia, Central America and nearly so from South America, except for the neotype, a few records from southeastern Brazil, and one record each from Colombia and Guyana. It has not previously been reported from the West Indies.

Distribution in Puerto Rico: Occurs mostly at or near sea level. Recorded from Arecibo, Florida, Río Grande, Vega Alta, and Vega Baja.

Note: Meyer's original type from Essequibo River is believed to be lost. Les & Crawford (1999) proposed the new genus *Landoltia* based on

Spirodela punctata as allozyme and cpDNA (rbcL) sequence data in this species differ from other species of *Spirodela* and *Lemna*. The recognition of this genus based on morphological characters however, is rather difficult as it is intermediate between other species of *Spirodela* and *Lemna*.

Selected specimens examined: Puerto Rico: Arecibo: Bo. Santana, S side of Ciénaga Tiburones, c. 1.5 km N of Aeropuerto de Arecibo, *Proctor & Rivera 46273* (US). Río Grande: Bo. Herreras, just N of Caño San Luis, *Proctor & Morris 45993* (US). Vega Baja: Bo. Cibuco, mangrove thicket 1.2 km due ENE of Cerro Cibuco, *Proctor et al. 45571* (US).

3. WOLFFIA

Wolffia Horkel ex Schleid., Beitr. Bot. 1: 233. 1844, *nom. conserv.*

Minute floating plants often occurring in vast numbers. Thallus globular, ovoid, cylindrical or boat-shaped, mostly free or 2 cohering. Veins and roots lacking, the tissue without air spaces. Flowering thallus similar to vegetative ones. Inflorescence one per plant, originating in a cavity more or less median on the upper surface of the thallus; pistillate flower consisting of a pistil; staminate flower with a single stamen. A cosmopolitan genus of 8 species.

Type: *Wolffia michelii* Schleid., *typ. conserv.*

1. Wolffia brasiliensis Wedd., Ann. Sci. Nat. Bot., ser. 3, 12: 170. 1849; *Grantia brasiliensis* (Wedd.) Mac Mill., Metasp. Minnesota Valley 134. 1892. Type: Brazil; Mato Grosso. *Weddell s. n.* (lectotype: STU; isolectotypes: K, L, MO) designated by Landolt, Veröff. Geobot. Inst. ETH Stiftung Rübel Zürich 71: 452. 1986.

Wolffia punctata Griseb., Fl. Brit. W. I. 512. 1864. Type: Jamaica. *Wullschlaegel, s. n.* (holotype: GOET?, isotype: STU).

Plants densely gregarious on still, fresh water. Thallus broadly ovate to suborbicular, 0.5-1.6 × 0.7-1.5 mm, rounded at the tip, with a prominent papule in the middle of the upper surface (sometimes lacking on smaller thallus). Plants occasionally flowering but rarely fruiting. Seeds ca. 0.4 mm long.

General distribution: Commonly in the southeastern United States, southern Mexico, Guatemala, El Salvador, the West Indies, northern and S. E. South America. First report for Puerto Rico.

Distribution in Puerto Rico: Known from a single collection in Cabo Rojo.

Selected specimens examined: Puerto Rico: Cabo Rojo: Bo. Llanos Costa, small pond 1 km. due ESE of intersection Roads 301 & 303, elev. 35 m, coll. 19 Sept. 1987, *Proctor & McKenzie 43935* (SJ).

4. WOLFFIELLA

Wolffiella (Hegelm.) Hegelm., Bot. Jahrb. Syst. 21: 303. 1895.

Thallus floating suspended under the surface in still fresh or slightly brackish water, some species said to rise to the surface when flowering or fruiting; tissue thin and translucent, the thallus solitary or several, cohering together, sometimes forming a loose ball; pigment cells occurring in some species at the nodal end of the thallus, there developing a flat triangular pouch out of which daughter thallus emerge. Flowers 1 or 2, produced from a cavity at the side of the median line of the upper thallus surface. Fruit a slightly compressed utricle with a persistent style; seeds smooth, with spongy outer coat. A widely distributed genus of 8 species.

Lectotype: *Wolffiella oblonga* (Phil.) Hegelm. (≡ *Lemna oblonga* Phil.), designated by Britton & A. Brown, Ill. Fl. N. U. S. ed. 2., 1: 449. 1913.

1. **Wolffiella welwitschii** (Hegelm.) Monod, Mém. Soc. Hist. Nat. Afrique N., Hors Sér 2: 229. 1949; *Wolffia welwitschii* Hegelm., J. Bot. 3: 114. 1865; *Wolffiopsis welwitschii* (Hegelm.) Hartog & Plas, Blumea 18: 366. 1970. Type: Angola; Quizambo. *Welwitsch 209* (holotype: STU; isotypes: BM, C, G, H, K, L, as cited by Landolt, 1986).

Wolffiella lingulata sensu Liogier & Martorell, 1982, non Hegelmaier, 1895.

Thallus submerged, with the basal part often near the water surface, the tip bent downward, 2 or 3 cohering together to form a saddle-shaped configuration; individual thallus broadly tongue-shaped, rounded at the tip, 4-7 × 2.5-5 mm, often 1.2-2 times longer than wide; a few stomata (to 12) occurring especially along the lateral margins of the base. Plants often flowering and fruiting. Flowers 2 per thallus. Seeds ca. 0.45 mm long, 0.3 mm thick.

General distribution: Widely distributed in tropical America and Africa; it occurs on all of the Greater Antilles and also on Guadeloupe in the Lesser Antilles.

Distribution in Puerto Rico and the Virgin Islands: Uncommon (or unobserved) in still, sheltered, fresh or slightly brackish water at or near sea level. Recorded from Loíza, Manatí, and Vega Baja; collected long ago in St. Croix.

Selected specimens examined: PUERTO RICO: Vega Baja: Bo. Cibuco, mangrove thicket 1.2 km due ENE of Cerro Cibuco, *Proctor et al. 45572* (US).

Family 3. **LIMNOCHARITACEAE** *Water-Poppy Family*

Limnocharitaceae Takht. ex Cronquist, Integr. Syst. Class. Fl. Pl.: 1048. 1981.

by M. T. Strong & P. Acevedo-Rodríguez

Rhizomatous or stoloniferous perennial aquatic herbs producing milky sap, of fresh water habitats; roots fibrous, not septate. Stems erect, unbranched, fleshy. Leaves submersed and floating, primarily basal, sessile or petiolate with sheathing base, glabrous; blades orbicular to lanceolate with entire margins, obtuse or subacute at apex with an apical pore, cordate to attenuate at base, venation reticulate, primary veins parallel from base of blade to apex, secondary veins reticulate. Inflorescence a terminal, involucrate umbel, erect to floating, bracteate, with vegetative buds in some species; bracts few to several, ovate, membranous, acuminate. Flowers bisexual, actinomorphic, hypogynous, pedicellate; sepals 3, persistent and enclosing flower and fruit; petals 3, often delicate, deciduous; stamens (6-) 20-25, distinct, basifixed; anthers 4-locular, dehiscing longitudinally; pistils (3-) 10-12, coherent proximally, 1-locular with numerous ovules, the placentation laminar; style short or absent, the stigma linear. Fruit a follicle, dehiscing adaxially; seeds numerous, U-shaped, glandular-pubescent or costate. A family of 3 genera and 8 species with pantropical distribution.

Type: *Limnocharis* Humb. & Bonpl.

References: Haynes, R. R. & L. B. Holm-Nielsen. 1992. The Limnocharitaceae. Fl. Neotrop. Monogr. 56: 1-34. Haynes, R. R. Fam. 220. Limnocharitaceae. Pp. 5-6. *In:* Flora of North America Editorial Committee (eds.), Fl. North Amer., vol. 22. 1993.

1. HYDROCLEYS

Hydrocleys Rich., Mém. Mus. Nat. Hist. 1: 368. 1815.

Submersed, stoloniferous herbs with submersed or floating leaves. Stems short, erect. Leaves basal, the submersed ones phyllodia, sessile, the floating leaves long-petiolate; petioles terete, septate, sheathing at base; blades orbiculate to oblong-lanceolate, rounded to cordate at base, mucronate to obtuse at apex. Inflorescences few- to many-flowered, occasionally proliferating with leaves and stolons; scape elongate, septate; bracts subtending pedicel, distinct, elliptic to lanceolate, shorter than pedicel. Flowers on elongate

pedicels; sepals erect, lanceolate, coriaceous, green, midvein present or absent, hood like at apex, persistent; petals erect to spreading, orbicular to oblong-obovate, fugacious, yellow to white; stamens 6 to many, in 1 to several series, the outer often sterile; carpels 3-8, terete, linear-lanceoloid, attenuate into style; style curved inward, papillose at apex. Follicles ± terete, linear-lanceoloid, membranous, dehiscing along adaxial margins; seeds numerous, sparsely to densely glandular-pubescent or glabrous. Five species with the center of distribution in South America; one species introduced in North America.

TYPE: *Hydrocleys commersonii* Rich.

1. Hydrocleys nymphoides (Willd.) Buchenau, Index Crit. Butom. Alism. Juncag. 2, 7. 1868; *Stratiotes nymphoides* Willd., Sp. Pl. 4: 821. 1805. Type: Venezuela. *Humboldt s.n.* (holotype: B-Willd.).

Plants 10-45 (-60) cm tall; stolons to 45 cm long. Leaves with petioles 1.5-40 (-70) cm × (0.9-) 1.7-10 mm, the sheathing base to 9 cm long; blades with 5-9 veins, broadly ovate to orbicular, (1.4-) 2-10 (-12) × (0.9-) 2-9 (-11) cm, obtuse to slightly mucronate at apex, cordate at base. Inflorescence 1- to 6-flowered, proliferating with stolons and leaves; peduncles 4-30 cm × 1.5-6 mm; bracts elliptic, 2-4.5 × 0.4-1 cm, obtuse at apex; pedicels spreading, 3.5-17.5 cm × 1.5-6 mm. Flowers 5.5-6.5 cm broad; sepals ovate-elliptic, 1.3-2.8 × 0.7-1.3 cm, narrowly scarious on margins; petals spreading, 2.3-3.5 × 3.5-4.4 cm, pale yellow to white with yellow base; stamens 20-25, the anthers 4-6 mm long; staminodes numerous; pistils 5-8, ca. 10 mm long. Follicle 10-18 × 2-3.5 mm, the beak 2.5-5.5 mm long. Seeds oblong-obovate, 1-1.3 × 0.7-0.8 mm, glabrous or glandular-pubescent to sparsely so, reticulate on surface, reddish.

General distribution: United States (Florida and Texas), Guatemala, Puerto Rico, Curaçao, Trinidad, and South America.

Distribution in Puerto Rico: Stagnant waters. Recorded from Añasco and Vega Alta.

Selected specimens examined: PUERTO RICO: Añasco: *Sintenis 5779* (U); Villa Espinosa, *N.L. Britton & E.G. Britton 9941* (NY).

Family 4. **ALISMATACEAE** *Water-plantain Family*

Alismataceae Vent., Tabl. Règne Vég. 2: 157. 1799, *nom. conserv.*

by G. R. Proctor

Perennial (sometimes annual) herbaceous, acaulescent plants with milky sap, aquatic or growing in wet or marshy places. Leaves petiolate, sheating at base, the blades flat and several-veined. Flowers bisexual or unisexual, symmetrical, whorled on terminal, erect racemes or panicles. Calyx of 3 persistent green sepals. Petals 3, white, delicate and soon falling. Stamens 6 or more, the filaments distinct, the anthers 2-locular. Carpels free, few or many, borne in heads in our species, each normally containing 1 ovule; style usually persistent, appearing as a beak on the fruit. Fruit a head of achenes. Seeds curved, the embryo horseshoe-shaped. A semi cosmopolitan family of 11 genera and ca. 75 species (Haynes & Holm-Nielsen, 1994), of which two occur in the Neotropics.

TYPE: *Alisma* L.

Reference: Haynes, R. R. & Holm-Nielsen, L. B. 1994. The Alismataceae. Fl. Neotrop. Monogr. 64: 1-112.

Key to the genera

1. Flowers all bisexual; fruits terete, usually ribbed, with glands between the ribs ..... 1. *Echinodorus*
1. Flowers, at least the basal ones, unisexual; fruits not terete, often with a curved wing ..... 2. *Sagittaria*

1. ECHINODORUS

Echinodorus Rich. ex Engelm. in A. Gray, Manual 460. 1848.

Annual or perennial herbs, glabrous to stellate-pubescent, growing emersed in shallow, fresh or slightly brackish water. Stems short-rhizomatous. Leaves petiolate; petioles trigonous, sheathing at base; blades linear to broadly ovate, often with pellucid dots or lines, the margins entire or undulating, the apex acute to acuminate, the base attenuate to cordate. Inflorescence erect, emersed, racemose or paniculate, rarely umbelliform; bracts free or partly connate, glabrous or papillose along the ribs, obtuse to acute. Flowers bisexual, subsessile to pedicellate; pedicels often elongating after anthesis; sepals herbaceous to coriaceous, reflexed or spreading; petals white, larger than the sepals; stamens 9-many, the filaments glabrous, the anthers versatile or basifixed; gynoecium of many free carpels, distributed evenly over the receptacle, each with a single ovule, the styles terminal or lateral, persistent on the fruits. Fruit a terete achene, often longitudinally ribbed, glandular, and beaked. A genus of 26 species distributed from the northern United States to Chile.

LECTOTYPE: *Echinodorus rostratus* (Nutt.) Engelm. (≡ *Alisma rostrata* Nutt.; = *Echinodorus berteroi* (Spreng.) Fassett), designated by Small, N. Amer. Fl. 17(1): 46. 1909.

Key to the species of *Echinodorus*

1. Leaf blades elliptic or ovate, usually truncate or subcordate at base, with 3-11 longitudinal veins; sheath at base of petiole to 7 cm long; inflorescence with up to 9 whorls of flowers; achenes with erect, terminal, beak 0.6-1.3 mm long ..... 1. *E. berteroi*
1. Leaf blades linear-lanceolate, attenuate at base, with 1-3 longitudinal veins; sheath at base of petiole not over 2 cm long; inflorescence umbelliform or with two whorls of flowers; achene with a lateral beak, 0.1-0.3 mm long ..... 2. *E. bolivianus*

1. Echinodorus berteroi (Spreng.) Fassett, Rhodora 57: 139. 1955; *Alisma berteroi* Spreng., Syst. Veg. 2: 163. 1825. [as "berterii"]. Type: Lesser Antilles; Guadeloupe. *Bertero s. n.* (holotype: GOET; isotype: TO).

Alisma rostratum Nutt., Trans. Amer. Philos. Soc. ser. 2. 5: 159. 1837. Type: Arkansas (or Oklahoma ?). *Nuttall s. n.* (holotype: PH; isotype: BM).

Echinodorus cordifolius sensu Bello, 1883, and sensu Britton & P. Wilson, 1923, non (L.) Griseb., 1857.

Fig. 11. A-D

Annual or short-lived glabrous herb of wet ditches and marshy sites; rhizomes erect, to 2.5 cm long; plants to 70 cm tall. Leaves variable in size and shape; petioles to 20 cm long; submerged leaves linear or ribbon-like; emersed leaves ovate, with pellucid lines. Inflorescence erect and overtopping the leaves, paniculate or sometimes a raceme of flowers in whorls; pedicels 0.6-2.8 cm long. Flowers 6-11 mm wide; petals clawed, spreading, 2.5-4.8 mm long; stamens ca. 15, with filaments to 7 mm long, the anthers versatile, ca. 8 mm long. Carpels numerous on an ovoid receptacle that enlarges in fruit. Achene terete, 2-keeled, glandular, to 3.2 mm long with slender erect beak 0.6-1.3 mm long.

General distribution: Northern United States to Mexico, Central America, the West Indies, northern South America and Peru.

Distribution in Puerto Rico and the Virgin Islands: At or near sea level in fresh-water ditches and marshes, and occasionally in habitats that are slightly brackish. Recorded from Añasco, Cabo Rojo, Cataño, Coamo, Guánica, Guayama, Guayanilla, Juana Díaz, Lajas, and Vega Baja; St. Croix and St. Thomas.

Common name: Puerto Rico: *Llantén de agua.*

Selected specimens examined: PUERTO RICO: Juana Díaz, *Proctor 43361* (US).

2. Echinodorus bolivianus (Rusby) Holm-Niels., Brittonia 31: 276. 1979; *Alisma bolivianum* Rusby, [as "*boliviana*"] Mem. New York Bot. Gard. 7: 208. 1927. Type: Bolivia; Reyes.

White 1540 (lectotype: NY; isolectotypes: GH, K, NY, US!), designated by Haynes & Holm-Nielsen, Fl. Neotrop. Monogr. 64: 14. 1994.

Alisma tenellum f. *latifolium* Seub. in Martius, Fl. Bras. 3(1): 105. 1848; *Echinodorus tenellus* var. *latifolius* (Seub.) Fassett, Rhodora 57: 202. 1955. *Echinodorus latifolius* (Seub.) Rataj, Stud. Ceskoslov. Akad. Ved. 2: 18. 1975. Lectotype: Brazil; Minas Gerais. *Claussen 50* (BR), designated by Haynes & Holm-Nielsen, Brittonia 38: 326. 1986.

Helianthium tenellum sensu Britton & P. Wilson, Bot. Porto Rico 5: 14. 1923, non *Alisma tenellum* Mart., 1830.

Small annual, glabrous herb of fresh-water marshes and pools. Rhizomes short, stoloniferous. Leaves erect, often numerous in a loose rosette; petioles varying greatly according to habitat, from ca. 1.5 cm long on plants growing on wet soil to 35 cm or more on plants submerged under water, in the latter case both leaf blades and inflorescence emersed above the water surface; leaf blades linear-lanceolate to lanceolate, 1-6(7.4) × 0.2-1.8 cm, pellucid lineolate, the apex acute to acuminate, the base long-tapering, veins 1 or usually 3, two of them located parallel to and close to the margins, the margins entire. Inflorescence erect and overtopping the leaves, umbelliform or sometimes a raceme with two whorls of 5-6 flowers; pedicels 1.1-6.2 cm long, bracteate at base, spreading. Sepals spreading, 2.8-3.6 × 2.8-3.6 mm, 7-veined; petals clawed, 2.5-4.1 mm long; stamens 9, the anthers basifixed, 0.5-0.6 mm long; carpels 15-20. Achene obovoid, 0.6-1.8 mm long, 3-or 4-ribbed, not keeled, glandless, the beak lateral, 0.1-0.3 mm long.

General distribution: Southernmost Mexico, Central America, Greater Antilles (except Cuba), and South America.

Distribution in Puerto Rico: Although known only from near sea level in Puerto Rico, this species occurs at various elevations up to 2000 meters elsewhere in its range. Collected in San Juan, Caja de Muerto Island, Salinas, and Vega Baja.

Selected specimens examined: PUERTO RICO: Vega Baja: Laguna Yeguada, *N.L. Britton et al. 6773* (US).

2. SAGITTARIA

Sagittaria L., Sp. Pl. 993. 1753.

Monoecious or rarely dioecious, perennial or rarely, glabrous to sparsely pubescent herbs of fresh or slightly brackish waters, the plants submerged, floating, or emerged. Stems often forming rhizomes, these sometimes terminated by tubers. Leaves sessile or petiolate; petioles terete or triangular; leaf blades present or sometimes absent, with or without basal lobes, lacking pellucid lines. Inflorescence racemose, paniculate or less often umbelliform with flowers usually arranged in paired whorls of 3; staminate flowers distal, pistillate flowers basal on inflorescence; sepals herbaceous to coriaceous, reflexed in staminate flowers, appressed or reflexed in pistillate flowers; petals usually white, rarely tinged with pink; stamens whorled, 7 to numerous, the anthers basifixed, linear to orbicular, the filaments linear or subulate, glabrous or pubescent. Carpels numerous, spirally arranged, each with 1 ovule, the styles terminal. Achene flattened, eglandular, winged, beaked, membranaceous. A primarily Western Hemisphere genus of about 25 species, 3-4 of which occur in Europe and Asia.

LECTOTYPE: *Sagittaria sagittifolia* L., designated by Small, N. Amer. Fl. 17: 51. 1909.

Reference: Bogin, C. 1955. A Revision of the genus *Sagittaria* (Alismataceae). Mem. New York Bot. Gard. 9: 179-233.

Key to the species of *Sagittaria*

1. Leaf blades linear, elliptic or ovate, attenuate at base, lacking basal lobes ..... 2. *S. lancifolia*
1. Leaf blades sagittate or hastate, with 2 large divergent lobes at base 2

2. Sepals appressed around fruiting aggregate; rhizome short, not stoloniferous, lacking tuberous corms; achenes 1.5-2.2 mm long ..... 1. *S. intermedia*
2. Sepals reflexed below fruiting aggregate; rhizomes producing slender stolons to 30 cm long, often bearing tuberous corms; achenes 2.5-3.5 mm long ..... 3. *S. latifolia*

1. Sagittaria intermedia Micheli in Alph. de Candolle & C. de Candolle, Monogr. Phan. 3: 80. 1881. Type: Cuba. *Wright 3199* (lectotype: K; isolectotypes: G, GH, GOET, MO, NY, S, US!, W), designated by Bogin, Mem. New York Bot. Gard. 9: 201. 1955.

Sagittaria acutifolia sensu Griseb., Cat. Pl. Cub. 218. 1866, and sensu Bello, 1883, non L. f., 1782 ["1781"].

Fig. 11. E-H

Perennial, glabrous herb with short rhizomes. Leaves emersed; petioles 17-45 cm long, trigonous, with basal sheath to 10.5 cm long; blades hastate to sagittate, 5-15 (-21) × 2-9 cm, the apex acute, the base hastate with slightly spreading acute to subacuminate lobes. Inflorescences simple or branching from lowest whorls, with 3-8 whorls of flowers; peduncles trigonous, mostly 15-25 cm long. Sepals ovate, 4-8 mm long; petals white, ca. 2.5 cm long in staminate flowers, ca. 1 cm long in pistillate flowers; stamens numerous, the filaments ca. 0.7 mm long, glabrous, the anthers terete, ca. 0.7 mm long. Achene obovoid, beaked, non-keeled, tuberculate, 1.5-2.2 mm long, grouped into a spherical aggregate, 0.6-1.5 cm in diam.

General distribution: Primarily on all four of the Greater Antilles, with a few isolated records from southernmost Mexico and northernmost Colombia.

Distribution in Puerto Rico: Uncommon in wet, marshy sites at or near sea level. Recorded from Cabo Rojo, Dorado, Hatillo, Loíza, Naguabo, and Río Grande.

Selected specimens examined: PUERTO RICO: Cabo Rojo: *Sintenis 679* (US). Dorado: *N.L. Britton et al. 6690* (US).

2. Sagittaria lancifolia L., Syst. Nat. ed. 10, 1270. 1759. Lectotype: Jamaica. *Browne s.n.* (LINN-1124.61), designated by Haynes & Holm-Nielsen, Fl. Neotrop. Monogr. 64: 89. 1994.

Perennial, glabrous to sparsely pubescent herb; rhizomes to 19 cm long and 4 cm thick. Leaves emersed, erect; petioles terete to trigonous, to 58 cm long, with basal sheaths to 26 cm long; blades linear, elliptic or ovate, 20-35 × 0.7-16 cm, chartaceous, pale green, with 7-9 longitudinal veins, the apex acute, the base obtuse. Inflorescence a raceme or panicle with up to 13 whorls, usually containing 3 flowers; peduncle 75-125 cm long; bracts striate, lanceolate to ovate-lanceolate. Staminate flowers with reflexed sepals; petals clawed, 0.8-1.5 cm long; stamens numerous, the filaments pubescent, 2.2-4 mm long, the anthers linear, 1.7-2.3 mm long. Pistillate flowers with reflexed or spreading sepals; petals clawed, 0.6-1.5 cm long. Achene obovate, beaked, keeled, 1.6-2.5 mm long, smooth, grouped into aggregates, 0.5-1.2 cm in diam.

General distribution: Coastal southeastern North America, Mexico, Central America, the Bahamas, Greater Antilles, Cayman Islands, and northern coastal South America from Colombia to Brazil.

Distribution in Puerto Rico: Frequent or common in wet marshy sites from sea level to middle elevations (ca. 500 m). Recorded from Aguada, Aibonito, Arecibo, Bayamón, Cabo Rojo, Cataño, Humacao, Manatí, Mayagüez, San Juan, Toa Alta, Toa Baja, Utuado, and Vega Baja.

Common names: Puerto Rico: *Flecha de agua, Saeta de agua.*

Selected specimens examined: PUERTO RICO: Aibonito: *Sintenis 2697* (US). Arecibo: Bosque de Río Abajo, Los Puercos, *Acevedo-Rdgz. et al. 2268* (NY, US, VINPS). Bayamón: *Johnston 912* (US); *Heller & Heller 416* (US); *Stevenson 114* (US); *Johnston & Stevenson 1149* (US). Cabo Rojo: *Sintenis 680* (US). Humacao: Playa de Humacao, *Eggers s.n.* (US). Manatí: Laguna Tortuguero, *N.L. Britton et al. 3844* (US). Mayagüez: *Sargent B31* (US); *N.L. Britton 2370* (US). Toa Alta: Puerto Flaco, *Goll et al. 917* (US). Toa Baja: Candelaria, *Goll et al. 281* (US). Vega Baja: *N.L. Britton et al. 6757* (US).

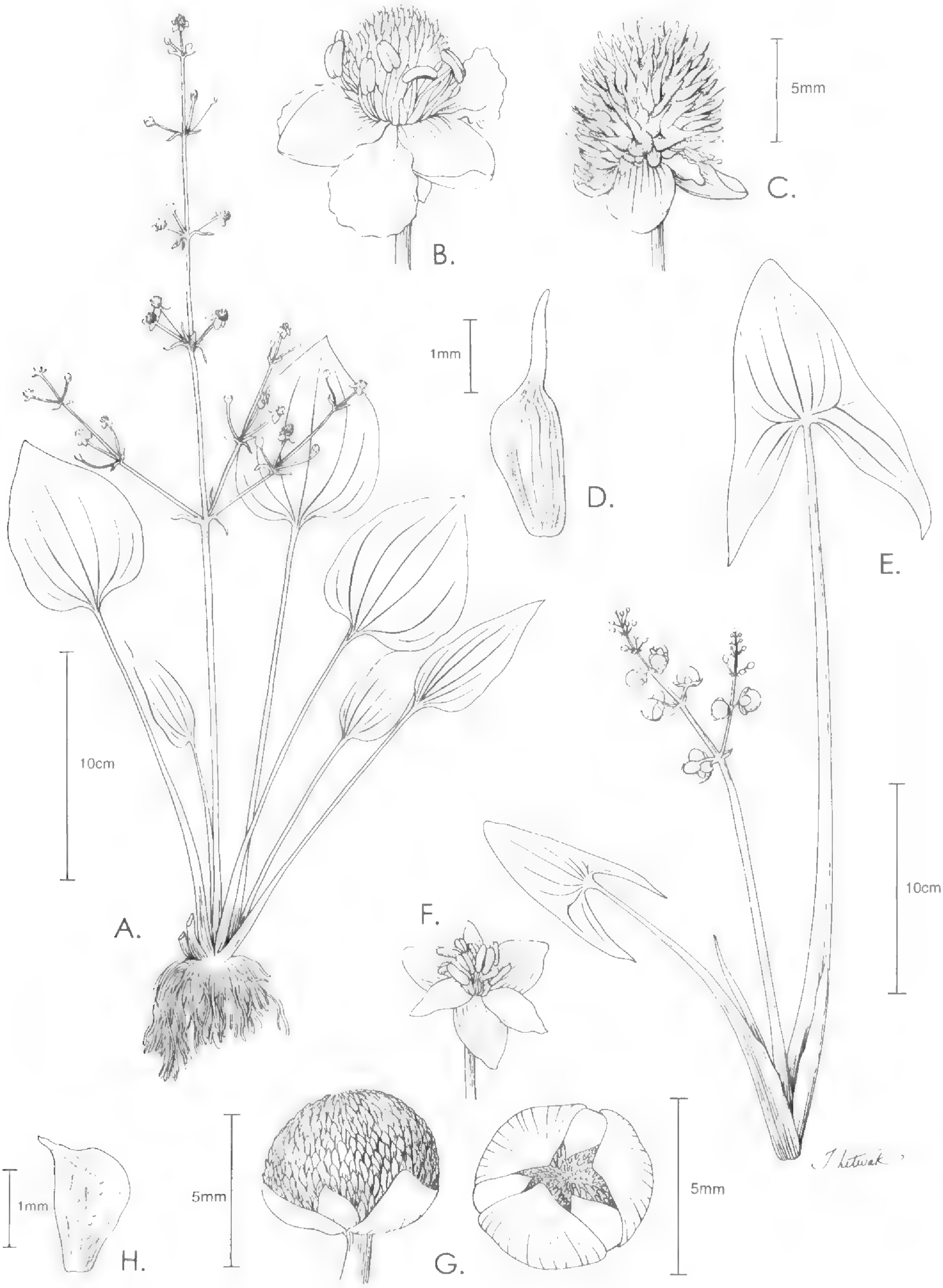


Fig. 11. A-D. *Echinodorus berteroi.* **A.** Habit. **B.** Flower at anthesis. **C.** Flower at fruiting stage. **D.** Achene. **E-H.** *Sagittaria intermedia.* **E.** Habit. **F.** Flower at anthesis. **G.** Flowers at fruiting stage, side and top views. **H.** Achene. (A-B, from *Proctor 43934*; C-D, from *Proctor 46370*; E, from *Proctor 46984*; F-H, from *Proctor 45331*).

3. Sagittaria latifolia Willd., Sp. Pl. 4: 409. 1805. Type: "Canada at Carolinam". *Muhlenberg s. n.* (holotype: B-Willd., fragm. US!).

Perennial glabrous or pubescent herb proliferating by stolons and/or corms, the stolons to 30 cm long and ca. 0.3 cm thick, the corms ca. 2 cm in diam. Leaves emersed, erect; petioles trigonous, 6.5-51 cm long with basal sheath 1.5-17.5 cm long; leaf blades pale green, sagittate or rarely hastate, 15-30 × 2-17 cm, with 7-13 longitudinal veins, the apex acute, or rarely obtuse, the base sagittate, with acuminate lobes 0.5-16.5 cm long. Inflorescences racemose or sparingly paniculate, with up to 9 whorls of flowers; peduncles trigonous, 10-59 cm long. Staminate flowers with reflexed or spreading sepals; petals clawed, 6-9 mm long; stamens 16-18, the filaments glabrous 1-3 mm long, the anthers linear, 1.2-1.9 mm long. Pistillate flowers with reflexed sepals; petals clawed, ca. 18 mm long. Achene oblanceolate, beaked, not keeled, 2.5-3.5 mm long, non-tuberculate, sometimes with 1 or 2 glands, grouped into an aggregate 1-1.7 cm in diam.

General distribution: North America to northern South America, and Puerto Rico.

Distribution in Puerto Rico: Recorded by a single specimen collected in marshy lands near San José Lagoon, San Juan by Hioram in 1909. Perhaps a chance introduction, and very likely now extirpated from Puerto Rico.

Selected specimens examined: PUERTO RICO: San Juan: San José Lagoon, *Hioram s.n.* (GH).

Family 5. **HYDROCHARITACEAE** *Frog's bit Family*

Hydrocharitaceae Juss., Gen. Pl. 67. 1789, *nom. conserv.*

by G. R. Proctor

Annual or perennial aquatic herbs, monoecious or dioecious, having either a creeping monopodial rhizome with roots at the nodes and distichous leaves, or an erect axis with roots at the base and leaves opposite, spirally arranged, or apparently whorled. Leaves eligulate, submerged or floating, linear, lanceolate, elliptic, ovate, or orbicular, with margins entire, serrulate or toothed, and either sessile and sheathed at base or else petiolate with leaf blade more or less expanded. Flowers symmetrical, unisexual or bisexual, sessile or pedicellate, solitary or in cymose inflorescences in a spathe of two, free or connate leaves; perianth absent or of one or two whorls, each of 3 free segments; stamens 1 or 3-several, the filaments slender or absent; ovary inferior, 1- to 15-carpellate, the ovules solitary or several; style 1-15. Fruit indehiscent, with membranous or fleshy pericarp; seeds fusiform, ellipsoid, or globose. A cosmopolitan family of marine and fresh-water plants with 17 genera and ca. 130 species.

TYPE: *Hydrocharis* L.

References: den Hartog, C., 1970. The sea grasses of the world, Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 59(1): 212-275. Guard, B. J., 1995. Wetland plants of Oregon & Washington. Long Pine Publishing, Canada. Les, D. H. & M. A. Cleland, 1997. Phylogenetic studies in Alismatidae II: Evolution of marine Angiosperms (sea grasses) and hydrophily. Syst. Bot. 22(3): 443-463. Phillips, R. C. & E. G. Meñez. 1988. Seagrasses. Smithsonian Contr. Marine Sci. 34: 1-104.

Key to the genera

1. Submerged marine plants (only in salt water). 2
   2. Leaves less than 4 cm long, petiolate, with oblong to elliptic blades ..... 2. *Halophila*
   2. Leaves 6-60 cm long, lacking petioles, with strap-shaped blades ..... 5. *Thalassia*
1. Submerged or floating plants of fresh or brackish water. 3
   3. Plants floating (rarely rooted on mud in very shallow water); leaves petiolate, entire, orbicular ..... 3. *Limnobium*
   3. Plants submerged; leaves oblong or narrowly linear 4

4. Stems few-branched; leaves oblong; flowers long-pedicellate, with conspicuous perianth ..... 1. *Elodea*
4. Stems much-branched; leaves narrowly linear; flowers sessile, without perianth .... 4. *Najas*

1. ELODEA

Elodea Michx., Fl. Bor.-Amer. 1: 20. 1803.

Perennial submerged, aquatic herbs of fresh water; stems slender, elongate, few-branched, rooted or often breaking free. Lowest leaves alternate, elsewhere opposite or whorled, sessile, linear or narrowly oblong, translucent, bright green, 1-nerved, the margins finely serrulate. Flowers borne from small axillary spathes, usually unisexual, produced on filiform stalks that raise them just above the water surface; sepals 3, petals 3; stamens 3-9. Fruit a several-seeded capsule. A New World genus of about 14 species, mostly occurring in temperate regions. Two species are widely cultivated in aquaria and have escaped and often become naturalized far from their original habitats.

TYPE: *Elodea canadensis* Michx.

Reference: St. John, H. 1967. The pistillate flower of *Egeria densa* Planch. Darwiniana 14(2-3): 571-573.

Key to the species of *Elodea*

1. All spathes with a solitary flower; leaves 0.6-1.2 cm long; petals narrower than the sepals ..... 1. *E. canadensis*
1. Staminate spathes with 2-several flowers; leaves up to 2 cm long; petals wider than the sepals ..... 2. *E. densa*

1. Elodea canadensis Michx., Fl. Bor.-Amer. 1: 20. 1803; *Anacharis canadensis* (Michx.) Planch., Mag. Nat. Hist., ser. 2. 1: 86. 1848. Type: Canada. *Michaux s. n.* (holotype: P).

Stems dichotomously few-branched; lower leaves alternate, opposite, or in whorls of 3; upper leaves in whorls of 3-7, linear-oblong, translucent green and 1-nerved, the margins denticulate, the apex blunt to acutish. Staminate flowers sessile, in a globose spathe, emitting an elongate filamentous floral tube with hypanthium at water surface; stamens 3-9. Pistillate flowers solitary, in a tubular spathe, raised to the water surface by a slender hypanthial tube, bearing 3 green sepals and 3 white petals. Fruit a several-seeded capsule.

General distribution: Eastern North America from Quebec to Virginia and west to California; widely introduced elsewhere and naturalized in Europe.

Distribution in Puerto Rico: Cited by Liogier & Martorell (1982) as occurring "in a lake near Florida"; not seen by the author. Often used in aquaria because it increases water oxygen levels and thrives in artificial habitats (Guard, 1995).

Common name: Puerto Rico: *Tomillo de agua.*

2. Elodea densa (Planch.) Casp., Monatsber. Königl. Preuss. Akad. Wiss. Berlin 1857: 49. 1857; *Egeria densa* Planch., Ann. Sci. Nat. Bot., ser. 3, 11: 80. 1849. *Anacharis densa* (Planch.) Vict., Contr. Lab. Bot. Univ. Montreal 18: 401. 1931. Type: Argentina; Buenos Aires. *Tweedie 10* (holotype: K).

Stems elongate, sparingly branched, 2-3 mm thick, rooted in the substrate or freely floating. Leaves linear-oblong, often 2-3 cm long, sessile, the lowermost ones opposite, the rest in whorls of 3-6, translucent, bright green, mid rib sometimes with a few teeth beneath, the margins finely toothed. Staminate inflorescences borne in axils of upper leaf-whorls, 2-4 flowers developing one at a time, their pedicels raising them just above the water surface; sepals 3, green, 3-4 mm long; petals 3, white, 8-10 mm long; stamens 9. Pistillate inflorescence axillary, 1-flowered, the spathe

tubular, 12-15 × 3.5-4 mm, bifid at tip with ciliolate teeth 1 mm long, the cleft ca. 6 mm down one side, through this slit issues the threadlike hypanthium tube; ovary 3.5 mm long, bearing at the tip the filiform elongate style that extends up through the hypanthium tube to the perianth and protrudes above the water surface; hypanthium tube white, 5.5 or more cm long; sepals 3-3.2 mm long, ovate, pale, greenish, reflexed at anthesis; petals 6-7 mm long, unequal, white, broadly elliptic, obtuse at apex, delicate, veinless; staminodes 3, at first white, becoming red, minutely glandular-papillose; style branched at apex into 3 stigmata, 3-3.3 mm long, these cleft into 3-4 finger-like, hairy lobes; nectaries present at base of style-branches. Fruit and seeds unknown.

General distribution: Native to South America. Cultivated in aquaria and fish ponds nearly worldwide, and often escaping and becoming naturalized in warm-temperate and tropical countries. Often classified and listed as *Egeria densa*, but the generic distinction from *Elodea* is based on characters that seem to be minor and unconvincing, of no more than subgeneric value.

Distribution in Puerto Rico: Cited by Liogier & Martorell (1982) as occurring "in water near Corozal"; not seen by the author.

2. HALOPHILA

Halophila Thouars, Gen. Nov. Madagasc. 2. 1806.

Submerged (often deeply), rooted, monoecious or dioecious, marine herbs with slender, widely creeping rhizomes bearing erect, short shoots at nodes, and 2 scales, one clasping the shoot, the other the rhizome, sometimes with an extra pair of scales between the base of shoot and petioles. Leaves two or more in pairs or pseudowhorls, sessile or petiolate, linear to elliptic or ovate, entire or serrulate, glabrous or minutely pubescent. Flowers unisexual, solitary or sometimes a staminate and a pistillate flower together in a single spathe; spathes sessile, consisting of 2 overlapping membranous bracts, usually axillary to erect shoots. Staminate flowers pedicellate; tepals 3; stamens 3, the anthers 2- or 4-locular; pollen grains globose, attached together in moniliform chains. Pistillate flowers sessile, with elongated hypanthium, crowned by 3 reduced tepals; ovary ellipsoid, unilocular, the styles 3-5, linear. Fruit ovoid, rostrate, with membranous pericarp; seeds globose, few to several. A cosmopolitan genus of 8 species, at least some occurring in all tropical and subtropical seas, a few extending into warm temperate areas.

LECTOTYPE: *Halophila ovalis* (R. Br.) Hook. f. (≡ *Caulinia ovalis* R.Br.), designated by Rydberg, N. Amer. Fl. 17: 67. 1909.

Reference: Short, F. L. & M. L. Cambridge. 1984. Male flowers of *Halophila engelmannii*: Description and flowering ecology. Aquatic Bot. 18(4): 413-416.

Key to the species of *Halophila*

1. Leaves in pairs only; shoots with a pair of scales at base ..... 2. *H. decipiens*
1. Leaves mostly in pseudowhorls of 2-4 pairs; shoots with 2 pairs of scales, one at the base and another between the base and the petioles 2
2. Individual leaves distinctly petiolate, with 3-5 pairs of cross veins ..... 1. *H. baillonis*
2. Leaves subsessile, with 6-8 pairs of cross veins ..... 3. *H. engelmannii*

1. Halophila baillonis Asch. in H. Moseley, J. Linn. Soc., Bot. 14: 317. 1874. Syntypes: St. Thomas, U. S. Virgin Is. *Moseley s. n.* (B, destroyed, K?); place unknown. *Bertero s.n.* (B, destroyed); Martinique. *Hahn s.n.* (B, destroyed).

Halophila aschersonii Ostenf., Bot. Tidsskr. 24: 239. 1902. Syntypes: St. Croix, U. S. Virgin Is. *Lassen s. n.* (C); *Börgeson s. n.* (C).

Dioecious marine herb; rhizomes slender, branching, 0.8-1 mm in diam., with a single unbranched root at each node. Lateral erect shoots 0.6-2 (-4) cm long, with 2 pairs of scales, one at the

base and another about halfway up; leaves petiolate, in a pseudowhorl of 2-3 pairs, at the shoot's apex; petioles 2-5 mm long; blades elliptic, 5-22 × 2-5 (-8) mm, the margins finely spinulose. Spathes lanceolate, 5-8 mm long. Staminate flower on pedicel ca. 3 mm long; anthers ca. 4 mm long. Pistillate flower 6-7 mm long with minute perianth; ovary sessile, the styles 2-5, each 10-30 mm long. Fruit spherical, 2-3 mm in diam. with a beak 4-5 mm long; pericarp membranous; seeds 10-20, subglobose, apiculate at both ends.

General distribution: Pacific coast of Panama, Cayman Islands, Jamaica, Puerto Rico, Virgin Islands, Guadeloupe, Curacao, and Brazil (Pernambuco).

Distribution in Puerto Rico and the Virgin Islands: Recorded from Culebra, Guánica, Lajas, Loíza, and Mayagüez; St. Croix and St. Thomas.

Note: The spelling " *baillonis*" is herein retained as the International Code of Botanical Nomenclature (Greuter et al., 2000) only recommends that treating Latinized modern names as if they were in third declension should be avoided, but does not mandate their standardization to the ii ending. The original description made reference to four specimens, but we have not been able to examine any of them for this treatment. Designation of a lectotype would be desirable, however, it must be designated only after a careful study of the original material.

Selected specimens examined: PUERTO RICO: Lajas: Media Luna Reef; Parguera., *Aponte & Vélez JN-15052* (US). Loíza: Sur de la Cáncora, *Vicente s.n.* (US). Mayagüez: Punta Arenas, *Díaz-Piferrer 2050, 2744* (US). ST. CROIX: West of Buck Island, *Abbott 11893* (US); Salt River, *Dill & Geology class 14185* (US).

2. Halophila decipiens Ostenf., Bot. Tidsskr. 24: 260. 1902. Lectotype: Thailand; Koh Kahdat. *J. Schmidt 540* (C), designated by R.A. Howard, Fl. Lesser Antill. 3: 22. 1979.
Halophila baillonis sensu Britton & P. Wilson, 1923 (and other American authors), not Ascherson, 1874.

Monoecious marine herb; rhizome threadlike, branching, 0.2-0.4 mm in diam., fragile, with a single unbranched root at each node. Lateral erect shoots each with 1 pair of leaves at apex, and a pair of scales at the base. Leaves opposite; petioles 3-15 mm long; blades oblong-elliptic, 10-18 (-25) × 3-6 mm, membranous, the margins finely serrulate, adaxially minutely pubescent, abaxially glabrous. Spathes ovate, acuminate, 3-6 mm long, with a staminate and a pistillate flower. Staminate flower on pedicel 3 mm long, with tepals 1-1.5 mm long; anthers ca. 1 mm long. Pistillate flower subsessile; hypanthium 1-2 mm long; ovary ca. 1 mm long, the 3 styles each 2.5 mm long. Fruit ellipsoid, 2.5 mm long, the beak 1.5-2 mm long; pericarp scarious; seeds ca. 30, ovoid, ca. 0.2 mm long.

General distribution: Pantropical.

Distribution in Puerto Rico and the Virgin Islands: Often occurs in shallow water (less than 1 m deep), but it has been found as deep as 90 m. Recorded from Cabo Rojo, Culebra, Guánica, Guayanilla, Lajas, Mayagüez, and Yabucoa; Guana Island, St. Croix, and St. Thomas.

Selected specimens examined: PUERTO RICO: Guánica: Cayos de Caña Gorda, 1 mi. offshore near Guánica, *Gittins 7557* (US). Guayanilla: Guayanilla Bay, *Vicente s.n.* (US). Lajas: ca. 3 mi. S of La Parguera, *Earle 66219* (US). ST. CROIX: Christiansted Lagoon, *Ostenfeld 290* (NY).

3. Halophila engelmannii Asch. ex Neumayer, Anl. Wiss. Beobacht. Reisen, 368. 1875. Type: United States; coast of Florida. Unknown collector (B?).

Dioecious marine herb; rhizome slender, branching, 1-1.3 mm in diam., with a single unbranched root at each node. Lateral erect shoots mostly 2-4 (-10) cm long, bearing 2 pairs of lanceolate to obovate scales, one at the base, the other about half way to the top, and at the apex 2-4 pairs of subsessile leaves, arranged in a pseudowhorl; blades oblong or elliptic-oblong, 10-25 (-30) × 3-6 mm, coriaceous, with obtuse apex and cuneate base, the margins minutely serrulate. Spathe lanceolate, acuminate, sessile in the axil of a leaf, enclosing a single flower. Staminate flowers on 4-10 mm long pedicels; tepals elliptic, reflexed; anthers 4 mm long. Pistillate flowers consisting of a hypanthium 3-5 mm long, a minute 3-parted perianth and a sessile or subsessile, ovoid ovary 3-4 mm long, the styles 3, ca. 3 cm long. Fruit and seeds not known.

General distribution: Coasts of Florida and the Gulf of Mexico to Texas; Bahamas, northern

Cuba, Cayman Islands, and Puerto Rico.

Distribution in Puerto Rico: Recorded from two localities, Cayo Pájaros, Salinas (*Vicente s.n.* US); and Bahia de Tallaboa, Peñuelas (*Britton & Cowell 1325*). The latter specimen had originally been misidentified and reported as *Halophila aschersonii* Ostenf. (*H. baillonis* Asch.).

Selected specimens examined: PUERTO RICO: Salinas: Cayo Pájaros, Jobos Bay, *Vicente s.n.* (US).

3. LIMNOBIUM

Limnobium Rich., Mém. Cl. Sci. Math. Inst. Natl. France 1811(2): 32, 66. 1814.

Perennial, monoecious herbs of fresh water, usually floating, spreading by means of stolons, and forming mats; sometimes rooted in mud, the roots elongate. Leaves strongly and unequally petiolate, forming rosettes that bud from the ends of stolons and remain attached to them; leaf blades ovate to suborbicular. Flowers unisexual, arising from leaf axils. Staminate flowers often 2 or 3 together, maturing sequentially, the pedicels elongating at anthesis; sepals and petals 3 each (rarely 4); stamens variable in number, with filaments united into a column, the anthers linear, attached at different levels; staminodes usually present. Pistillate flowers solitary, enclosed in 2-cleft spathes; sepals rudimentary; petals rudimentary or wanting; ovary unilocular, usually with 6 placentas; styles 6, with deeply divided linear stigmas. Fruit a globose or ellipsoid, many-seeded berry. A unispecific genus of the western hemisphere, its single species divided into two subspecies.

TYPE: *Limnobium spongia* (Bosc) Steud. (≡ *Hydrocharis spongia* Bosc).

Reference: Lowden, R. M. 1992. Floral variation and taxonomy of *Limnobium* L. C. Richard (Hydrocharitaceae). Rhodora 94: 111-134.

1. Limnobium spongia subsp. **laevigatum** (Humb. & Bonpl. ex Willd.) Lowden, Rhodora 94: 129. 1992; *Salvinia laevigata* Humb. & Bonpl. ex Willd., Sp. Pl. 5: 537. 1810; *Limnobium laevigatum* (Humb. & Bonpl. ex Willd.) Heine, Adansonia, ser. 2, 8: 315. 1968; *Hydromystria laevigata* (Humb. & Bonpl. ex Willd.) Hunz., Lorentzia 4: 5. 1981. Type: Colombia; Bogotá. *Humboldt & Bonpland s. n.* (holotype: B-Willd. 20251).

Hydromystria stolonifera G. Mey., Prim. Fl. Esseq. 153. 1818; *Limnobium stoloniferum* (Meyer) Griseb., Fl. Brit. W. I. 506. 1864. Type: Guyana; Essequibo River. *Meyer s. n.* (holotype: GOET).

Interconnected rosette-plants, either floating or rooted in mud. Leaves unequally petiolate, the petioles 0.3-3 cm long (rarely to 15 cm); blades ovate to suborbicular, 1.5-4 (-8) × 1.3-5 (-6) cm, the apex obtuse or rounded, the base short-cuneate or truncate, the margins entire, glabrous, fleshy or spongy. Staminate flowers with lanceolate sepals and white, often bilobed linear petals; fertile stamens (3-) 6 (-10); staminodes 0-3; filaments shorter than the anthers. Pistillate flowers with a subulate hypanthium and 0-8 staminodes; stigmatic lobes commonly 8-12. Fruits ellipsoid, 10-15 × 3.5 mm, with 3-6 protruding placentas; seeds 0.1-0.3 mm long, beaked and covered with minute trichomes.

General distribution: Mexico, Central America, Greater Antilles (except Jamaica), Lesser Antilles, Trinidad, and South America as far south as Argentina but rare or lacking in most of the Amazon basin.

Distribution in Puerto Rico: Very rare, in shallow ponds, sluggish shaded streams, and in fresh-water ditches or swamps at or near sea level. It is noteworthy that this species grows at elevations of up to more than 2, 000 meters in South America. Recorded from Añasco, Loíza, Mayagüez, Río Grande, and Vega Alta.

Common name: Puerto Rico: *Cuchara.*

Selected specimens examined: PUERTO RICO: Añasco: *Sintenis 5779* (US). Mayagüez: *N.L. Britton 2383* (US). Río Grande: Bo. Herreras, Road 187, *Proctor & Thomas 45238* (US).

4. NAJAS

Najas L., Sp. Pl. 1015. 1753.

Monoecious or dioecious submerged, aquatic herbs of fresh or brackish water, often rooted with fibrous roots: stems very slender, often much branched. Leaves linear or linear-lanceolate, opposite or crowded and apparently whorled, sheathing at base, the margins minutely spinescent or sometimes toothed. Flowers solitary, axillary, very small, lacking a true perianth. Staminate flower subtended by an inner hyaline scale and an outer spathe-like bract; stamen solitary, sessile, the anther 1- to 4-locular. Pistillate flowers consisting of a single naked ovary; style short or lacking; stigmata 2-4. Fruit a 1-seeded drupelet with a membranous coat. A cosmopolitan genus of about 50 species.

TYPE: *Najas marina* L.

References: Les, D. H., Cleland, M. A., & Waycott, M. 1997. Phylogenetic studies in Alismatidae, II: Evolution of marine Angiosperms (Seagrasses) and hydrophyly. Syst. Bot. 22: 443-463. Lowden, R. M. 1986. Taxonomy of the genus *Najas* (Najadaceae) in the Neotropics. Aquatic Bot. 24: 147-184.

Note: This taxon has until recently been treated as a separate family Najadaceae. However, cladistic studies (Les et al., 1997) suggest that *Najas* belongs in the Hydrocharitaceae, and it is so treated here.

Key to the species of *Najas*

1. Leaves flaccid, with minutely spinescent margins; plants monoecious ..... 1. *N. guadalupensis*
1. Leaves stiff, with coarsely toothed margins; plants dioecious ..... 2. *N. marina*

1. Najas guadalupensis (Spreng.) Magnus, Beitr. Kenntn. Najas 8. 1870; *Caulinia guadalupensis* Spreng., Syst. Veg. 1: 20. 1824. Type: Guadeloupe. *Bertero s. n.* (lectotype: TO; isolectotype: M), designated by Lowden, Aquatic Bot. 24: 169. 1986.

Najas major sensu Bello, Anales Soc. Esp. Hist. Nat. 12: 115. 1883, non All., 1785.

Fig. 12. A-D

Plants forming dense tangles rafts in fresh or brackish water. Leaves opposite or clustered; blades linear, 10-25 × 0.5-1.5 mm, the apex acute or obtuse, the margins minutely spinescent or rarely entire; sheaths widened, with 5-10 small teeth. Stamens 2-3 mm long; pistil 1-2.5 mm long. Fruit ca. 2 mm long, spinulose-tipped; seeds narrowly ellipsoid, conspicuously reticulate.

General distribution: Southeastern United States west to California; Mexico to Panama, Bahamas (Inagua), Greater Antilles, Antigua, Guadeloupe, Aruba, Curaçao, and South America as far south as Argentina.

Distribution in Puerto Rico: In ponds, ditches, slow-moving streams and rivers at low elevations (sea level to ca. 250 m). Recorded from Bayamón, Cabo Rojo, Caguas, Ciales, Coamo, Dorado, Guánica, Utuado, and Vega Baja.

Selected specimens examined: PUERTO RICO: Bayamón: *N.L. Britton et al. 3830* (US). Cabo Rojo: Bo. Llanos Costa, *Proctor & McKenzie 43936* (US). Caguas: *Sintenis 2533* (US). Coamo: Coamo Springs and river, *N.L. Britton et al. 5803* (US). Dorado: *N.L. Britton et al. 6707* (US). Guánica: Guánica Lake, *N.L. Britton & Shafer 1869* (US). Utuado: *N.L. Britton & Cowell 435* (US). Vega Baja: Bo. Cibuco, in marshy pond area just SW of playa Cerro Gordo, *Proctor et al. 45570* (US).

2. Najas marina L., Sp. Pl. 1015. 1753. Lectotype: "Habitat in Europae maribus." (LINN-1156.1), designated by Viinikka, Ann. Bot. Fenn. 13 : 128. 1976.

Fig. 12. E-I

Submerged dioecious herb, branching profusely and forming dense masses; stems brittle, armed with numerous brownish spinulose teeth on the internodes; branches many, often 20-40 cm long. Leaves opposite, linear, 1-4.5 cm long, stiff, the margins beset with coarse triangular teeth, 1 mm long or more; basal leaf sheaths widened, without teeth. Staminate flower subsessile, with outer envelope and stamen enclosed in a thin, tubular perianth. Pistillate flower solitary in upper

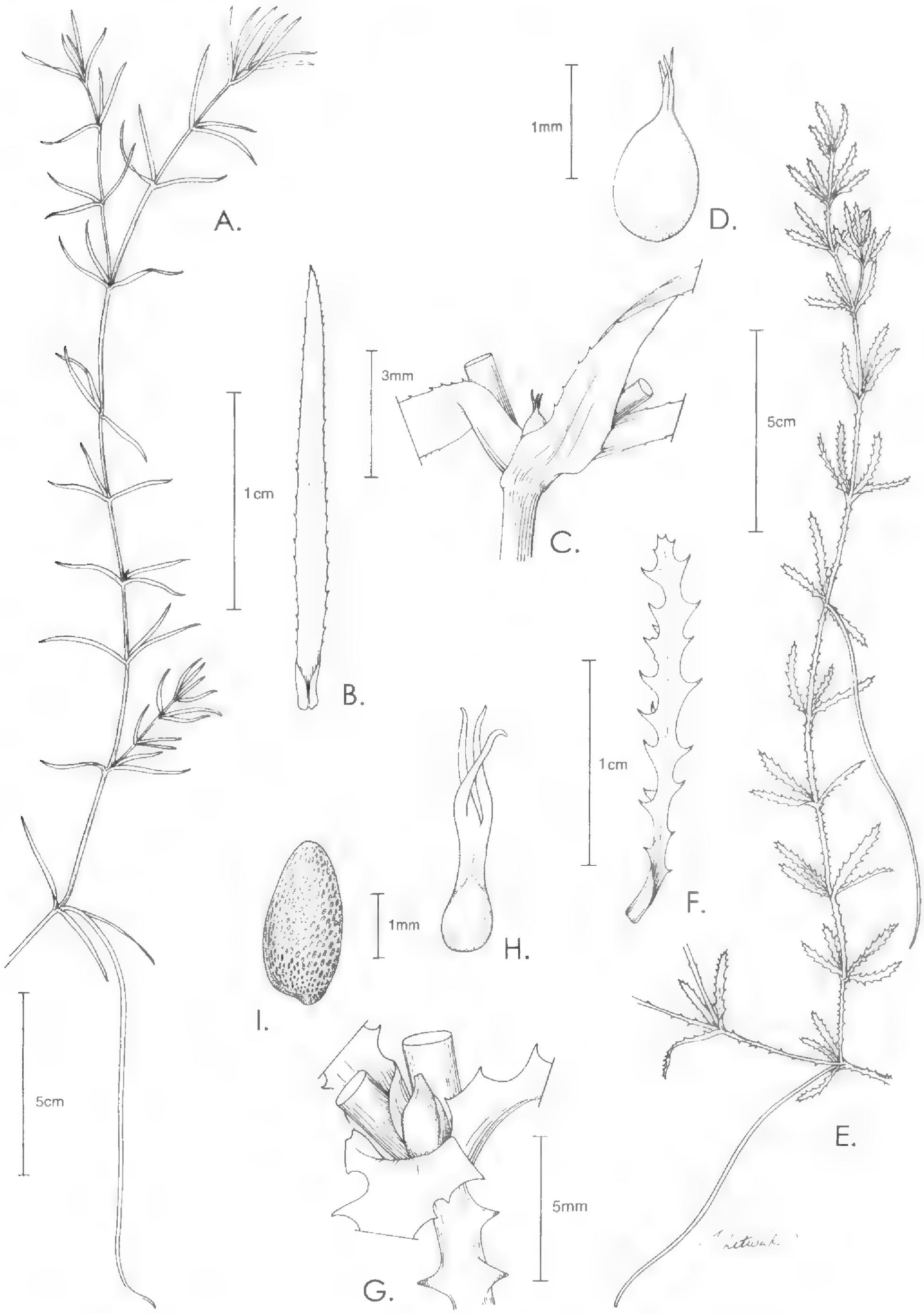


Fig. 12. A-D. *Najas guadalupensis*. **A.** Habit. **B.** Leaf. **C.** Infructescence. **D.** Fruit. **E-I.** *Najas marina*. **E.** Habit. **F.** Leaf. **G.** Infructescence. **H.** Pistillate flower. **I.** Seed. (A, from *Proctor 45570*; B-D, from *Proctor 44116*; E, G-I, from *Proctor 45529*; F, from *Proctor 46143*).

axils. Fruits 3-4 mm long, reticulate; seeds ellipsoid, ca. 3 mm long, pitted with many irregular rows of polygonal areoles.

General distribution: North America from New York to California and southward; Mexico and Central America (rare); Bahamas, Greater Antilles (very rare in Cuba and Puerto Rico); South America south to Argentina (apparently absent from the Amazon basin); widespread in Eurasia, and Australia; apparently absent from Africa.

Distribution in Puerto Rico: Recorded only from Arecibo and Manatí.

Selected specimens examined: PUERTO RICO: Arecibo: Bo. Garrochales, Ciénaga Tiburones, *Proctor et al. 46143* (US). Manatí: Western end of Laguna Tortuguero, *N.L. Britton 7878* (GH, NY, US).

5. THALASSIA

Thalassia Banks & Sol. ex K. D. Koenig, Ann. Bot. (König & Sims) 2: 96. 1805.

Perennial dioecious marine herbs with elongate, scaly, often contorted rhizomes, producing short erect shoots at nodes. Leaves tufted, 2-6 together, eligulate, linear, strap-shaped, often somewhat falcate and sheathing at the base. Inflorescence solitary, arising from leaf axils, bearing 1(2) staminate and 1 pistillate flowers; peduncles enclosed at base within a tubular spathe that is 2-cleft toward the apex; perianth segments 3, strap-like; stamens (3-) 9 (-12); filaments very short or obsolete; ovary muricate, unilocular, the 6-8 styles, each split into 2 filiform segments with stigmas longer than the styles. Fruit globose, echinate, with fleshy pericarp, splitting irregularly; seeds few, pyriform. A genus of 2 species, one occurring in the Caribbean area, the other found in the Indian Ocean and western Pacific Ocean regions, including the East Indian Archipelago and the Red Sea.

LECTOTYPE: *Thalassia testudinum* Banks & Sol. ex K. D. Koenig, designated by Rydberg, N. Amer. Fl. 17: 73. 1909.

1. Thalassia testudinum Banks & Sol. ex K. D. Koenig, Ann. Bot. (König & Sims) 2: 96. 1805. Type: Antigua. *Smeathman s. n.* (BM).
Fig. 13. A-E

Plants submerged except sometimes at lowest tides; rhizomes branching dichotomously, 3-6 mm thick with internodes 4-7 mm long, clothed with loosely appressed ovate scales; erect leafy shoots produced at intervals of 5-10 internodes, with persistent sheaths 6-10 cm long. Leaf linear, (4-) 10-50 × 0.4-1.2 cm, the apex obtuse, the margins entire to minutely serrulate. Staminate flower: peduncle 3-7 cm long; spathe 1.5-3 cm long; tepals 2-10 mm long; stamens 9, the anthers oblong, 8-9 mm long. Pistillate flower: peduncle 3-4 cm long; spathe 1.5-2 cm long; ovary ca. 1 cm long, bearing 7 or 8 styles, each 1.5-2 cm long. Fruit ellipsoid or globose, 1.5-2 cm long with a beak 4-7 mm long, the pericarp echinate, splitting irregularly; seeds usually 3, pyriform, to 10 mm long.

General distribution: Sheltered marine habitats throughout the Caribbean Sea and Gulf of Mexico, also Bermuda and the Atlantic coast of Florida and in the Bahamas.

Distribution in Puerto Rico and the Virgin Islands: In shallow marine waters from low tide level down to a depth of ca. 10 meters, forming extensive dense colonies. Common in sheltered coastal waters all around Puerto Rico and the Virgin Islands but recorded by voucher specimens only from Ceiba, Culebrita, Fajardo, Guánica, Guayanilla, Mayagüez, and Río Grande; Anegada, Guana Island, St. Croix, St. Thomas, St. John, Tortola, and Virgin Gorda.

Common names: Puerto Rico: *Hierba de Manatí, Palma de mar.*

Selected specimens examined: PUERTO RICO: Guánica: Playa Tamarindo, Bahia Ballena, S of Guánica, *Gittins 7598* (US). Guayanilla: Playa Tamarindo, Bahia Ballena, *Gittins 7598* (US). ST. CROIX: Smuggler's Cove, *Phillips s.n.* (US-3); *Phillips s.n.* (US-3); *Phillips s.n.* (US-2); Romney Point, N shore, E end, *Ogden 624* (US). ST. JOHN: Reef Bay Quarter, Gentry Bay, *Acevedo-Rdgz. 2732* (US).

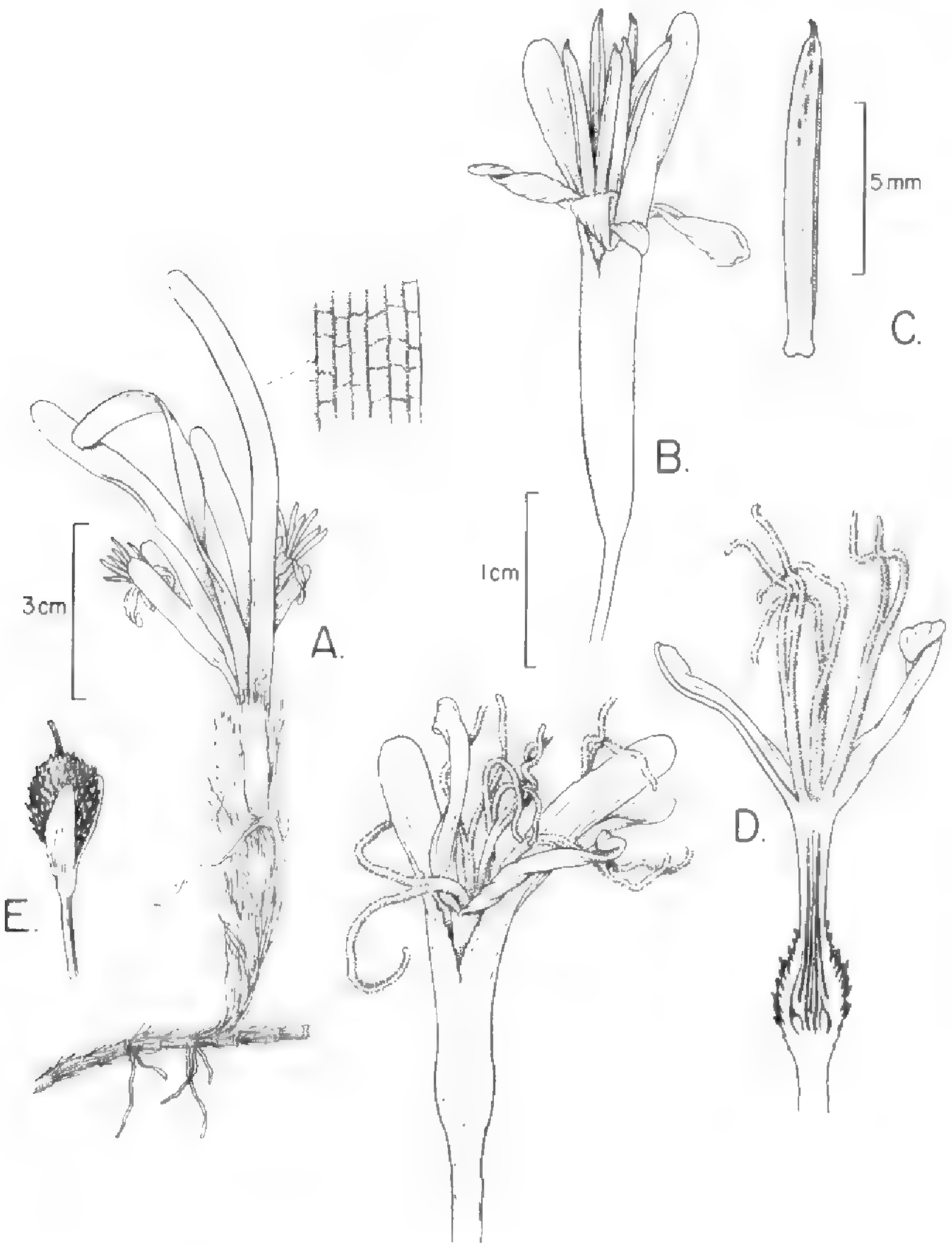


Fig. 13. A-E. *Thalassia testudinum.* **A.** Habit and detail of retiulate venation. **B.** Staminate flower. **C.** Stamen. **D.** Pistillate flower and l.s. pistillate flower. **E.** Fruit. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

Family 6. **CYMODOCEACEAE** *Manatee-grass Family*

Cymodoceaceae N. Taylor, N. Amer. Fl. 17: 31. 1909, *nom. conserv.*

by G. R. Proctor

Monoecious or dioecious, submerged, perennial herbs with slender, elongate, monopodial, rhizomes rooted in marine sand. Leaves closely distichous, flattened-linear and several-nerved or cylindrical and lacking an evident midvein; sheathed at base. Flowers unisexual, either solitary and axillary or else few to several on stalked axillary cymes. Perianth absent. Staminate flower consisting of two partially fused filaments each with a 2- or 4-locular anther that are distally fused and longitudinally dehiscent; pollen threadlike. Pistillate flowers consisting of 2 free carpels with long, slender styles, these simple or 2- or 3-branched, terminating in slender stigmas; carpels with a single apical pendulous ovule. Pollination effected underwater. Fruit indehiscent, with a hard, nutlike endocarp and a solitary seed. A family of 5 genera and 16 species, distributed around the world in mostly shallow marine waters of tropical, subtropical, and warm temperate regions.

TYPE: *Cymodocea* K.D. Koenig, *nom. conserv.*

References: den Hartog, C. 1964. An approach to the taxonomy of the sea-grass genus *Halodule* Endl. (Potamogetonaceae). Blumea 12: 283-312. den Hartog, C., 1970. The sea grasses of the world. Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect.59 (1): 144-186.

Note: The author follows Dahlgren et al. (1985) and Haynes & Holm-Nielsen (2003) in treating *Halodule* within the family Cymodoceaceae instead of Potamogetonaceae.

Key to the genera

1. Leaf blades flat, toothed at the apex; flowers solitary; style single ..... 1. *Halodule*
1. Leaf blades subulate, terete or nearly so; flowers in cymose inflorescences; styles 2 .... 2. *Syringodium*

1. HALODULE

Halodule Endl., Gen. Pl. 1368. 1841.

Dioecious marine herbs with rooted, creeping rhizomes, at each node these producing a short upright stem bearing 1-4 leaves. Leaf sheaths persistent; leaf blades narrowly linear, flat. Flowers solitary, each enclosed in a leaf-sheath. Staminate flower stalked, consisting of two anthers at different levels. Pistillate flower subsessile, consisting of two free carpels with long styles. Fruit drupe-like, subglobose-ovoid, slightly compressed and with a short beak. A genus of 6 species widely distributed in shallow tropical seas.

TYPE: *Halodule tridentata* (Steinh.) Endl. ex Unger (≡ *Diplanthera tridentata* Steinh.).

Key to the species of *Halodule*

1. Leaf apex acute and mucronate (one large central tooth and two, minute lateral ones) .... 1. *H. beaudettei*
1. Leaf apex emarginate (with two equal lateral projecting teeth) ..... 2. *H. wrightii*

1. Halodule beaudettei (Hartog) Hartog, Blumea 12: 303. 1964; *Diplanthera beaudettei* Hartog, Pacific Naturalist 1(15): 4. 1960. Type: Panama; Jicarón Is. *Dawson 21104* (holotype: US!).

Rhizomes creeping, with 2-4 roots and a short, erect stem at each node; internodes 2-4 cm long. Leaf sheaths 0.5-6 cm long; blades narrowly linear, 5-20 cm × 0.5-1.5 mm, the apex acute, mucronate, the mucron 1-10 times as long as the narrow lateral teeth. Flowers born within sheaths of the branches just above the rhizome. Staminate flower consisting of 2 anthers, inserted on a stalk that contains tannin cells on either side of the stalk just below the higher anther. Pistillate flower consisting of 2 carpels on a stout stalk, one inserted obliquely above the other, and tannin cells on either side of the stalk just below the upper carpel, ovary asymmetrical, with a single, filiform, lateral style. Nearly mature fruit yellow, bulb-like.

General distribution: Southeastern United States from North Carolina to Florida, the Gulf of Mexico, the Caribbean coast of Central America, Bahamas, Cuba, Cayman Islands, Jamaica, Hispaniola, Virgin Islands, Guadeloupe, Marie Galante, Trinidad, Curacao, and Venezuela.

Distribution in Puerto Rico and the Virgin Islands: Coastal marine areas. Not collected yet in Puerto Rico, but expected there; St. Croix and St. Thomas.

Selected specimens examined: St. Croix: Krause Lagoon, *Børgesen s. n.* (K, C). St. Thomas: Saen ven Tutu, *Krebs s. n.* (C); idem *Hornemann s. n.* (C); Mosquito Bay, *Ostenfeld 182* (C).

2. Halodule wrightii Asch., Sitzungsber. Ges. Naturf. Freunde Berlin 1868: 19. 1868; *Diplanthera wrightii* (Asch.) Asch. in Engler & Prantl., Nat. Pflanzenfam., Nachtr. 1: 37. 1897. Type: Cuba. *Wright 3720* (holotype: K; isotype: US!).

Rhizomes jointed, creeping. Leaf sheaths 1.5-4 cm long; blades 5-8 cm × 0.3-1 mm, the apex appearing emarginate (two lateral projecting teeth). Staminate flower on stalk 12-23 mm long; anthers 3.5-5 mm long, containing tannin cells. Pistillate flower consisting of an ellipsoid, ovoid or globose ovary, 1.5-2 mm long, the style apical

or sub apical, 10-28 mm long. Mature fruit brown or blackish, ovoid or globose, 1.5-2 × 1.5 mm, farinaceous, apiculate. Seldom seen in flower or fruit.

General distribution: Greater Antilles, Cayman Islands, Lesser Antilles, the coast of East Africa (Kenya, Tanzania, Mozambique), Madagascar, Mauritius, and the west coast of Australia.

Distribution in Puerto Rico and the Virgin Islands: In most coastal marine areas. Collected only from Cabo Rojo, Ceiba, Culebrita Island, Guánica, Guayanilla, and San Juan; St. Croix, St. John, and St. Thomas.

Selected specimens examined: PUERTO RICO: Cabo Rojo: Joyuda Lagoon, *Vicente s.n.* (US-3). Ceiba: Roosevelt Roads Naval Research Station, Bo. Guayacán: Pelican Bay, between Punta Algodones & Punta Cascajo, *Proctor et al. 48039* (US). Guayanilla: Guayanilla Bay, *Phillips. s.n.* (US-5). ST. CROIX: Christiansted Lagoon, *Børgesen s.n.* (US); Long Point, *Phillips s.n.* (US-3). ST. JOHN: Lameshur Bay, *Phillips s.n.* (US); *Randall s.n.* (US). ST. THOMAS: Mosquito Bay, *Ostenfeld s.n.* (US).

2. SYRINGODIUM

Syringodium Kütz. in Hohenacker., Alg. Mar. Exsicc. 9: 426. 1860.

Dioecious marine herbs with branched, widely creeping, monopodial rhizomes, rooted in sand, bearing at frequent intervals short, upright shoots bearing 2 or 3 leaves with persistent sheaths at base. Leaf blades subulate. Inflorescence cymose, the lower branches dichasial. Individual flowers enclosed by the bases of a pair of reduced bract-like leaves. Staminate flower stalked, consisting of two basally connate anthers. Pistillate flowers sessile, consisting of two, free ovaries, each with a short style which divides into two linear stigmas. Fruit drupe-like, obliquely ellipsoid, with a short bifid apex. A genus of two species, one in the Caribbean, the other occurring in the Indian and western Pacific Oceans.

TYPE: *Syringodium filiforme* Kütz.

Reference: Tomlinson, P. B. & U. Posluszny. 1978. Aspects of floral morphology and development in the seagrass *Syringodium filiforme* (Cymodoceaceae). Bot. Gaz. 139: 335-345.

1. Syringodium filiforme Kütz. in Hohenacker., Alg. Mar. Exsicc. 9: 426. 1860. Lectotype: St. Thomas, U. S. Virgin Islands. *Hohenacker 426* (BM), designated by Dandy & Tandy, J. Bot. 77: 115. 1939.

Cymodocea manatorum Asch., Sitzungsber. Ges. Naturf. Freunde Berlin 1868: 19. 1868. Type: To be sought among several syntypes.

Fig. 14. A-E

Rhizomes tough and wiry. Leaf sheaths 2.5-6 cm long; blades 10-30 cm long, 0.8-2 mm thick, narrowed at the base. Staminate flowers on stalks 5-10 mm long; anthers ovate, 4-5 mm long. Pistillate flowers: ovary ellipsoid, 3-4 mm long; style 2-3 mm long; stigmas 4-6 mm long. Fruit obliquely obovoid, 6-7 mm long, the bifid apical portion (rostrum) 2-3 mm long.

General distribution: Bermuda and throughout the Caribbean Sea and Gulf of Mexico, but absent from the shores of South America.

Distribution in Puerto Rico and the Virgin Islands: Collected in Cabo Rojo, Ceiba, Culebrita, and Río Grande, but undoubtedly occurs along most coasts of Puerto Rico and adjacent islands; Guana Island, Peter Island, St. Croix, St. John, and St. Thomas.

Common name: Puerto Rico: *Yerba manatí.*

Selected specimens examined: PUERTO RICO: Culebra: Culebrita, *Proctor 45063* (US). Guánica: *Acevedo-Rdgz. 3687* (US). ST. CROIX: Knight Bay, ca. ½ km from shore, *Fosberg 56809* (US); *Eggers s.n.* (US). Frederiksted: *Børgesen s.n.* (US). ST. JOHN: Tektite Project, transect 1, *Earle s.n.* (US); Great Lameshur Bay, *Earle s.n.* (US).

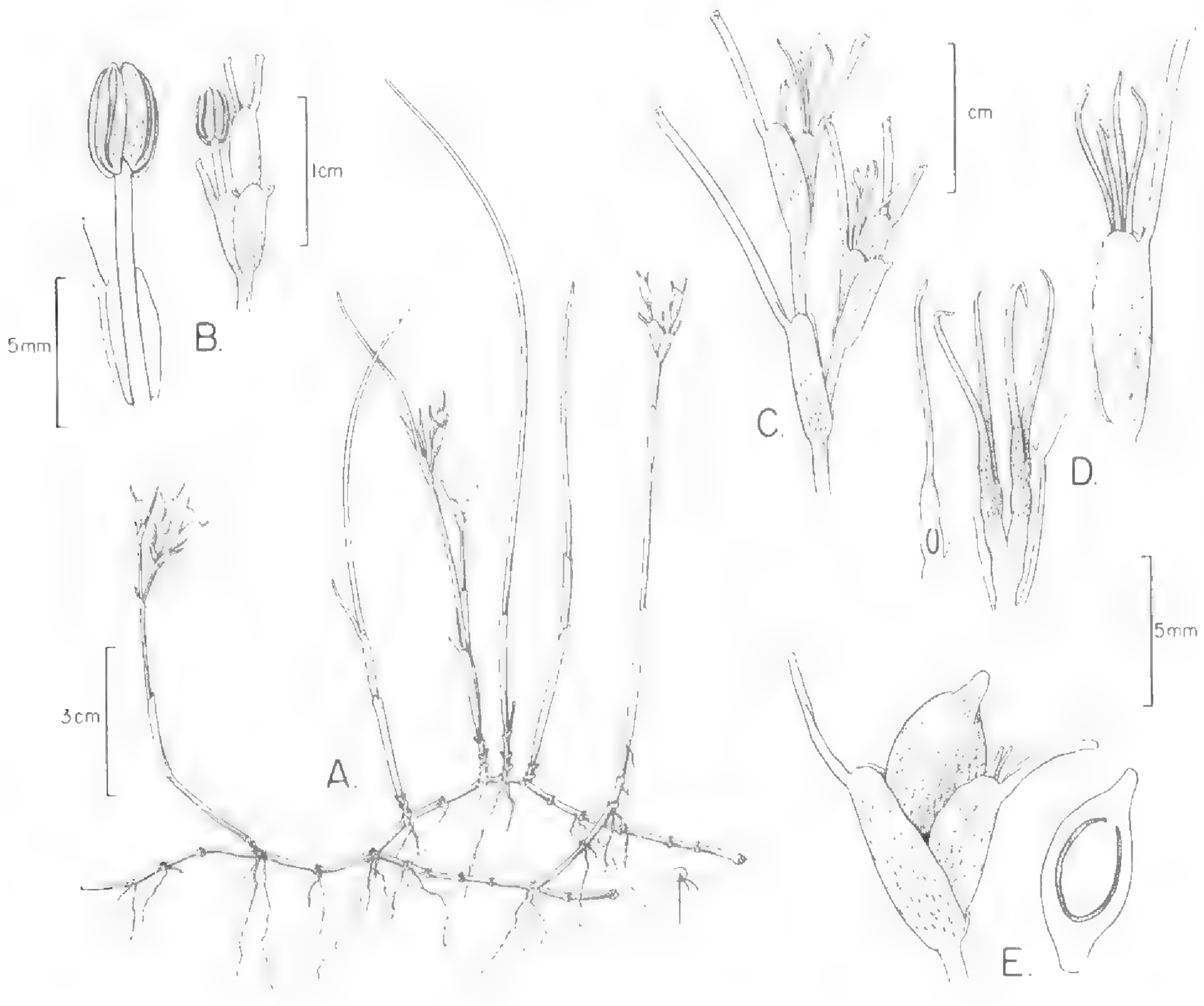


Fig. 14. A-E. *Syringodium filiforme*. **A.** Habit. **B.** L.s. bracteal leaf showing stamen, and portion of inflorescence with staminate flower. **C.** Portion of inflorescence showing pistillate flowers. **D.** L.s. pistil, l.s. bracteal leaf showing pistils, and pistillate flower. **E.** Fruit with subtending bracts, and l.s. fruit. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

Family 7. **RUPPIACEAE** *Ditch-grass Family*

Ruppiaceae Horan., Fam. Pl. 2: 48. 1934, *nom. conserv.*

by G. R. Proctor & P. Acevedo-Rodríguez

Submerged aquatic herbs of fresh, brackish, or sometimes saline water, with long, thread-like, forking stems. Leaves alternate or opposite; blade long-linear; sheath loose, auriculate. Inflorescence of spikes, usually 2-flowered, initially produced in leaf-axils within the basal sheath, then becoming protruded by elongation of the peduncle. Flowers bisexual; perianth absent; stamens 2, the filaments very short, with 2-locular anthers, the locules separated by a connective; carpels 2-19, free, sessile, each with a single, pendulous or campylotropous ovule, the style lacking, the stigma peltate. Fruit a minute drupe, at first sessile, usually becoming long-stipitate as it ripens. A family of a single genus and ca. 10 species, of cosmopolitan distribution.

TYPE: *Ruppia* L.

Note: Some authors, including Dahlgren et. al. (1985) and Strong in Acevedo-Rodríguez (1996), have included *Ruppia* in the Potamogetonaceae. However, Ruppiaceae differs from Potamogetonaceae in (1) lacking a perianth; (2) having 2 instead of 4 stamens; (3) having unique isobilateral instead of globose pollen; (4) having ovules pendulous from the apex of the ovary instead of ventromarginal; (5) having long-

stipitate instead of sessile fruits; (6) having a chromosome count of 8-10 instead of 13-15; and (7) growing chiefly in brackish, saline, or alkaline water instead of chiefly in fresh water. Because of these differences, the authors are maintaining two separate families.

1. RUPPIA

Ruppia L., Sp. Pl. 127. 1753.

Characters as given above for the family. A genus of nearly world-wide distribution, with ca. 10 species.

TYPE: *Ruppia maritima* L.

Reference: Jacobs, S. W. L. & M. A. Brock. 1982. A revision of the genus *Ruppia* (Potamogetonaceae) in Australia. Aquatic Bot. 14: 325-337.

Key to the species of *Ruppia*

1. Peduncle of inflorescence 0.6-5(11.5) mm long, not becoming greatly elongated after fruiting; druplet's stipe 0-2 mm long ..... 1. *R. didyma*
1. Peduncle of inflorescence 15-50 mm long, sometimes up to 30 cm after fruiting; druplet's stipe (3)5-30 mm long ..... 2. *R. maritima*

1. Ruppia didyma Sw. ex Wikstr., Kongl. Vetensk. Acad. Handl. 1825: 427. 1825. Type: St. Barthelemy. *Forsström s. n.* (holotype: S).

Ruppia anomala Ostenf., Bull. Torrey Bot. Club. 42: 659. 1915. Type: Puerto Rico. *Britton & Shafer1870* (holotype: C; isotypes: NY!, US!).

Submerged plants, rooted in mud, the stems 0.5-1(1.4) mm in diam. Leaf sheaths 7-10 mm long; blades linear or filiform, 2-7 cm × 0.5-0.9 mm, acute at apex. Peduncles 0.6-5(11.5) mm long, not elongating after anthesis. Drupelets ovoid, 2-3 mm long, with pedicel-like stipes 0-2 mm long.

General distribution: Mexico (Yucatan), scattered throughout the West Indies.

Distribution in Puerto Rico: Known from a single collection from Guánica lagoon.

Selected specimens examined: PUERTO RICO: Guánica: border of Guánica Lake, *Britton & Shafer 1870* (type of *Ruppia anomala* Ostenf., Bull. Torrey Bot. Club. 42: 659. 1915, holotype: NY!; isotype: US!).

2. Ruppia maritima L., Sp. Pl. 127. 1753. Lectotype: Italy. Micheli, *Nov. Pl. Gen., t. 35. 1729*, designated by Setchell, Proc. Calf. Acad. Sci., ser. 4. 25: 470. 1946.

Fig. 15. A-F

Submerged plants, rooted in mud, with light green to whitish stems to 1 m long. Leaf sheaths 6-10 mm long; blades linear or filiform, 3-11 cm × 0.3-0.8 mm, narrowly acuminate at apex. Peduncles 1.5-5 cm long, elongating after anthesis to 30 cm long. Druplets ovoid, 2-3 mm long, with pedicel-like stipes usually (0.3)0.5-3 cm long in umbellate clusters.

General distribution: Cosmopolitan.

Distribution in Puerto Rico and the Virgin Islands: Near sea level in brackish or saline ponds, lagoons, estuaries, and in sheltered mangrove habitats. Recorded from Arecibo, Bayamón, Cabo Rojo, Ceiba, Culebra, Guánica, Guayanilla, and Vieques; Anegada, Guana Island, St. Croix, St. Thomas, and St. John.

Common name: Puerto Rico: *Yerba de zanja.*

Selected specimens examined: PUERTO RICO: Arecibo: Bo. Garrochales, Ciénaga Tiburones, in immediate outflow of artesian well beside centerline road 0.4 km S of Caño Tiburones, *Proctor et al. 46136* (US). Bayamón: *Sintenis 1020* (US). Culebra: Flamingo Bay, *Howe 195* (US). Guánica: Guánica Lake, *N.L. Britton et al. 5510* (US). Guayanilla: Tamarindo Beach, S of Guánica State Forest, *Strong et al. 459* (US). GUANA ISLAND: White Bay, *Proctor 48402* (US). ST. CROIX: Great Pond, *McMillan 56792* (US); Buck Island, *N.L. Britton & Shafer 657* (US). ST. THOMAS: *Hornbeck s.n.* (US).

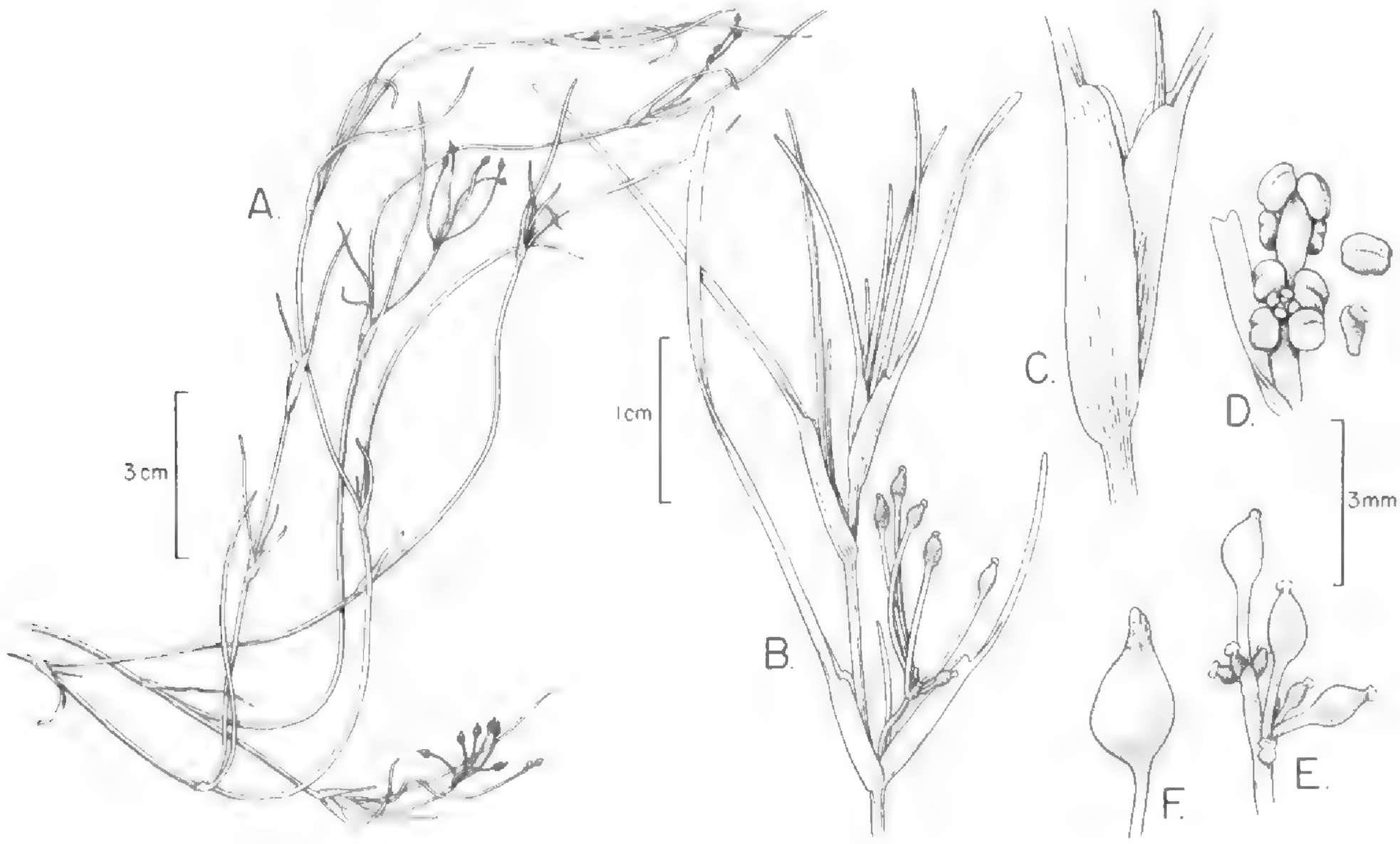


Fig. 15. A-F. *Ruppia maritima.* **A.** Habit. **B.** Portion of flowering culm. **C.** Detail of culm with inflorescence hidden by leaf sheaths. **D.** Inflorescence, stamen, and carpel. **E.** Infructescence. **F.** Drupelet. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

Family 8. **POTAMOGETONACEAE** *Pondweed Family*

Potamogetonaceae Dumort., Anal. Fam. 59, 61. 1829, *nom. conserv.*

by G. R. Proctor

Perennial aquatic herbs, chiefly of fresh water, proliferating not only by seeds but also by rhizomes, tubers, or detached winter buds. Leaves alternate, sheathing at base, sometimes dimorphic; submerged leaves linear or nearly filiform; floating leaves much wider. Flowers bisexual, in pedunculate, axillary spikes, originating between stipular sheaths; perianth of 4 clawed valvate segments; stamens 4, attached to the claws of the perianth-segments; anthers 2-locular, sessile, each with a connective produced into a broad sepaloid appendage; ovary of 4 free carpels, each with a single ovule and a sessile stigma. Fruit a sessile, indehiscent, 1-seeded drupe, with fleshy or spongy exocarp and crustaceous endocarp. A cosmopolitan family of two genera and ca. 100 species.

TYPE: *Potamogeton* L.

Reference: Haynes, R. R. & L. B. Holm-Nielsen. 2003. Potamogetonaceae. Fl. Neotrop. Monogr. 85: 1-52.

1. POTAMOGETON

Potamogeton L., Sp. Pl. 126. 1753.

Characters as given above for the family. A genus of about 100 species of subcosmopolitan distribution with center of distribution in temperate regions.

LECTOTYPE: *Potamogeton natans* L., designated by N. Taylor, N. Amer. Fl. 17(1): 14. 1909.

Key to the species of *Potamogeton*

1. Leaves all submerged, all similar, narrowly linear; spikes 0.2-7 mm long, cylindrical or capitate ..... 1. *P. foliosus*
1. Leaves of 2 kinds, submerged and floating, the submerged ones linear or narrowly lanceolate, the floating ones elliptic; spikes 20-70 mm long, cylindrical 2
   2. Floating leaves coriaceous, with entire margins, slightly inconspicuous venation, and petioles 2-12.5 cm long ..... 3. *P. nodosus*
   2. Floating leaves membranous, with crenate margins, conspicuous venation, and petioles 0.5-3 cm long ..... 2. *P. illinoensis*

1. Potamogeton foliosus Raf., Med. Repos., ser. 2, 5: 354. 1808; *Potamogeton pauciflorus* Pursh, Fl. Amer. Sept. 121. 1814, *nom. illeg.* Type: United States; South Carolina. *Michaux s. n.* (holotype: P, photo at GH).

Potamogeton gramineus sensu Michaux, Fl. Bor.-Amer. 1: 102. 1803, non L., 1753.

Plants rooted, entirely submerged; stems filiform, flattened, branched. Leaves narrowly linear, 2-6 cm × 0.5-2.5 mm, acute or subacute at apex, slightly tapering at base, 3- to 5-nerved with prominent mid rib, the margins entire; young stipules free from the leaf base, 7-18 mm long, soon deciduous. Peduncles 0.5-1.8 mm long; flower spikes capitate, few-flowered. Fruits lenticular or nearly orbicular, 1.8-2 × 2-2.5 mm, the keel crested; embryo an incomplete spiral.

General distribution: Throughout North America, Central America, Greater Antilles, parts of South America, and Hawaii.

Distribution in Puerto Rico and the Virgin Islands: Frequent in slow-flowing streams and rivers at low to middle elevations (sea level-400 m). Recorded from Aguas Buenas, Bayamón, Coamo, Isabela, Mayagüez, Jayuya, Lares, Vieques, and Yauco; St. Croix.

Selected specimens examined: Puerto Rico: Aguas Buenas: *Sintenis 2536* (US). Coamo: vicinity of Coamo Springs, *N.L. Britton & Cowell 1334* (US). Isabela: Bo. Coto, W side of Río Guajataca, from hwy 2 bridge to 1.2 km upstream, *Proctor 44117* (US). Jayuya: *Sintenis 6306* (US). Lares: *Sintenis 5818* (US). Yauco: *Sintenis 3489* (US).

2. Potamogeton illinoensis Morong, Bot. Gaz. 5: 50. 1880. Type: United States; Illinois. *Patterson s. n.* (lectotype: NY; isolectotype: BM), designated by González, Taxon 36: 112. 1987.

Potamogeton pulchelliformis Hagstr., Ark. Bot. 27(7): 12. 1922. Type: Haiti. *Ekman H326* (holotype: S).

Rooted plants with both submerged and floating leaves; stem erect, terete. Submerged leaves elliptic to lanceolate or rarely linear, 5-20 × 0.2-4.5 cm, 7- to 19-nerved, sessile or petiolate. Floating leaves elliptic to oblong-elliptic, 4-19 × 2-6.5 cm, 13- to 29-nerved, the apex rounded, mucronate, the base cuneate, the margins entire; petioles 2-9 cm long; blade sheath brownish, 3-9 cm long. Spikes cylindrical, 2.5-7 cm long; peduncles 4-30 cm long. Fruits laterally compressed, obovate, 2.5-3.6 mm long, crested, the embryo forming a complete spiral.

General distribution: North and Central America, Greater and Lesser Antilles, and South America.

Distribution in Puerto Rico: Uncommon, native herb, recorded from Toa Baja, Tortuguero and Utuado.

Selected specimens examined: Puerto Rico: Toa Baja: Río Dorado, *Liogier et al. 33773* (UPR). Utuado: *Sintenis s.n.* (BM), *Sintenis 6501* (MO); Caonillas Arriba, *Sintenis 6310* (GH),

3. Potamogeton nodosus Poir. in Lamarck, Encycl. Suppl. 4: 535. 1816. Type: Canary Is. *Broussonet s. n.* (P).

Potamogeton occidentalis Sieber ex Cham. & Schltdl., Linnaea 2: 224. 1827. Type: Martinique. *Sieber 275* (lectotype: LE; isolectotypes: G, GOET, HAL, P), designated by Haynes & Holm-Nielsen. Fl. Neotrop. Monogr. 85: 26. 2003.

Potamogeton pennsylvanicus var. *portoricensis* Graebn. in Urban, Symb. Antill. 4: 73. 1903; *Potamogeton nuttallii* var. *portoricensis*

(Graebn.) Graebn. in Engler, Potamogetonaceae. Pflanzenr. IV. 11 (Heft 31): 56. 1907. Syntypes: Puerto Rico. *Sintenis 1025 & 2537* (S).

Potamogeton insulanus Hagstr., Kongl. Svenska Vetenskpsakad. Handl. 55(5): 154. 1915. Type: Puerto Rico. *Sintenis 2537* (S).

Potamogeton epihydrus sensu Britton & P. Wilson, Bot. Porto Rico 5: 10. 1923, non Rafinesque, 1808.

Potamogeton plantaginea sensu Bello, Anales Soc. Esp. Hist. Nat. 12: 115. 1883, non Roem. & Schult., 1818.

Potamogeton fluitans sensu Britton & P. Wilson, Bot. Porto Rico 5: 10. 1923, and Graebn. in Engler, Potamogetonaceae. Pflanzenr. IV. 11 (Heft 31): 61. 1907, non Roth, 1788.

Rooted plants with both submerged and floating leaves; stem slender, nearly terete, branched. Submerged leaves linear- to elliptic-lanceolate, 9-20 × 1-3.5 cm, pellucid-punctate, 7- to 15-nerved, petiolate. Floating leaves broadly elliptic, 3-11 × 1.5-4.5 cm, 9- to 21-nerved, the apex acute or acuminate, the base acute to rounded, the margins entire; petioles 3.5-26 cm long; blade sheath brownish, 3.5-6.5 cm long. Spikes cylindrical, 2-7 cm long; peduncles 3-15 cm long. Fruits obovoid, 2.7-4.3 mm long, crested, the embryo forming a complete spiral.

General distribution: North and Central America, Greater and Lesser Antilles, South America, Europe, Africa, and Asia.

Distribution in Puerto Rico: In slow-flowing streams and rivers, rarely in ponds, at low elevations. Recorded from Arecibo, Bayamón, Cabo Rojo, Dorado, Hatillo, Isabela, Loíza, Manatí, Maunabo, Río Grande, San Juan, San Sebastián, Toa Baja, Utuado, and Vega Baja.

Common name: Puerto Rico: *Lino de agua.*

Selected specimens examined: PUERTO RICO: Arecibo: *N.L. Britton & Cowell 305* (US). Bayamón: *Sintenis 1025, 1025b* (US). Dorado: *Woodbury s.n.* (UPR). Hatillo: *Sargent B86* (US). Loíza: *Stevenson 5472* (US). Manatí : Laguna Tortuguero, *Sintenis 6670* (US). Río Grande: Río del Espiritu Santo, *Eggers 1191* (US). San Sebastián: Guajataca Gorge, *Liogier et al. 30349* (UPR). Utuado: *Sintenis 6310* (US). Vega Baja: *N.L. Britton et al. 6763* (US). Vega Baja: Bo. Cibuco, along Río Cibuco, ca. 1 km due SE of Cerro Cibuco, *Proctor et al. 45628* (US).

Family 9. **SMILACACEAE** *Sarsaparilla Family*

Smilacaceae Vent., Tabl. Règne Vég. 2: 146. 1799, *nom. conserv.*

by P. Acevedo-Rodríguez

Herbaceous to slender woody vines aided by tendrils, or less often erect herbs or shrubs, arising from creeping, starchy rhizomes. Leaves alternate or sometimes opposite; petioles usually with a pair of tendrils at junction with short stipule-like flanges. Flowers small, commonly unisexual (the plant dioecious) or less often bisexual, actinomorphic, 3-merous, produced in axillary umbels, racemes, or spikes bearing lateral umbels; staminate flowers lacking pistillodes; pistillate flowers bearing staminodes. Perianth of 6, equal, petaloid tepals in 2 series, free or connate at base into a short tube; nectaries commonly at the inner base of the tepals or at the base of the stamens or staminodes; stamens commonly 6 or less often more numerous or only 3, the filaments distinct, sometimes adnate to the perianth tube, or more or less connate into a column, the anthers opening by longitudinal slits; gynoecium 3-pistillate, ovary superior, trilocular or unilocular, the placentation accordingly axile or parietal, the ovules 1 to many per locule, the styles terminal, distinct, or basally connate. Fruit a 1- to 6-seeded berry. A family of about 12 genera and ca. 375 species, mostly with tropical and subtropical distribution, but occurring in subtemperate zones as well.

TYPE: *Smilax* L.

Reference: Howard, R. A. 1979. The genus *Smilax* L. in the Lesser Antilles. Taxon 28: 55-58. 1979.

1. SMILAX

Smilax L., Sp. Pl. 1028. 1753.

Dioecious, herbaceous or woody vines, with starchy rhizomes; stems cylindrical, wiry, armed or unarmed. Leaves alternate, simple, with arching parallel veins; petioles with a pair of filiform tendrils at junction with the open sheaths. Flowers unisexual, 3-merous, actinomorphic, with 6 perianth segments, produced in axillary umbels. Staminate flowers with 6 stamens, the anthers basifixed; pistillate flowers usually bearing staminodes, the ovary 3-pistillate with 1 or 2 ovules per carpel. Fruit a fleshy berry; seeds 1-6. A genus of about 350 species from primarily tropical and subtropical areas but extending into temperate zones.

LECTOTYPE: *Smilax aspera* L., designated by Britton & A. Brown, Ill. Fl. N. U. S. ed. 2. 1: 527. 1913.

Key to the species of *Smilax*

1. Leaves coriaceous or thick-coriaceous, usually with spiny margins, the apex obtuse to rounded; stems spiny ..... 1. *S. coriacea*
1. Leaves chartaceous, with entire margins, the apex acuminate; stems not spiny ..... 2. *S. domingensis*

1. Smilax coriacea Spreng., Syst. Veg. 2: 103. 1825. Neotype: Puerto Rico; Cayey. *Sintenis 2252* (US), here designated.

Smilax ilicifolia Desv. ex Ham., Prodr. 58. 1825; *Smilax coriacea* var. *ilicifolia* (Desv. ex Ham.) O. E. Schulz in Urban, Symb. Antill. 4: 150. 1903. Type: West Indies. *Desvaux s. n.* (P).

Smilax havanensis var. *portoricensis* A. DC. in Alph. de Candolle & C. de Candolle., Monogr. Phan. 1: 124. 1878. Syntype: Puerto Rico. *Wydler 341* (FI); Dominican Republic. *Rob. Schomburgk 71* (TO).

Smilax coriacea Bello, Anales Soc. Esp. Hist. Nat. 12: 120. 1883, *nom. illeg.,* non Sprengel, 1825. Type. Puerto Rico. *Bello s.n.* (destroyed).

Smilax rotundifolia Bello, Anales Soc. Esp. Hist. Nat. 12: 120. 1883, *nom. illeg.,* non L., 1753. Type: Puerto Rico. *Bello s.n.* (destroyed).

Smilax guianensis var. *subarmata* O. E. Schulz in Urban, Symb. Antill. 4: 149. 1903; *Smilax subarmata* O. E. Schulz in Urban, Symb. Antill. 5: 28. 1904. Type: Puerto Rico. *Sintenis 4943* (syntype: B, destroyed); *Sintenis 5932* (syntype: B, destroyed).

Smilax lappacea sensu O. E. Schulz in Urban, Symb. Antill. 5: 37. 1904, non Willd., 1806.

Smilax ilicifolia var. *sublappacea* sensu O. E. Schulz in Urban, Symb. Antill. 5: 37. 1904, non A. DC., 1878.

Figs. 16. A-F; 60. H

Slightly woody vine, to 5 m long; stems slender, cylindrical, wiry, puberulent or slightly scabrous, with scattered curved spines. Leaves alternate, simple; blades 2-17 × 1-12 cm, ovate, elliptic, oblong, lanceolate or linear, coriaceous or thick-coriaceous, glabrous, with 3-7 parallel veins, the margins spiny or entire, the apex acute to rounded, usually mucronate, the base rounded, obtuse or cordate; petioles 0.5-2 cm long, slightly swollen, with a pair of filiform tendrils near the base. Inflorescence a flexuous spike bearing lateral umbels, or less often a solitary, axillary umbel. Perianth yellowish, in staminate flowers, 2-3 mm long, in pistillate flowers 1.5-1.8 mm long. Berry globose or depressed-globose, 5-7 mm diam., turning from green to black at maturity.

General distribution: Hispaniola, Puerto Rico, Virgin Islands, and the Lesser Antilles.

Distribution in Puerto Rico and the Virgin Islands: Common in open disturbed areas, from low to middle elevations. Reported from Arecibo, Barranquitas, Bayamón, Cabo Rojo, Cayey, Ciales, Coamo, Fajardo, Guánica, Isabela, Jayuya, Manatí, Maricao, Maunabo, Mayagüez, Río Grande, Sabana Grande, Salinas, San Germán, San Juan, San Lorenzo, Vieques, and Yauco; Guana Island, St. Croix, St. John, St. Thomas, Tortola, and Virgin Gorda.

Common names: Puerto Rico: *Dunguey, Dunguey blanco;* Virgin Islands: *Greenbriar.*

Note: A neotype is here designated because

the original material used by Spreng. in describing this species is apparently lost. In a previous publication (Acevedo-Rdgz., 1986), *Smilax coriacea* Spreng was treated as a synonym of *S. havanensis* Jacq, following Liogier's (1982) *Synoptical Flora of Puerto Rico and adjacent islands*. However, they are distinct species easily recognized by the venation pattern. *Smilax coriacea* has interprimary veins borne at an angle of 45° to 90° from the primary vein, while those of *S. havanensis* are ascending, being borne at 25° to 35°. *Smilax havanensis* occurs in Cuba and Hispaniola but does not reach Puerto Rico or the Virgin Islands.

Selected specimens examined: PUERTO RICO: Arecibo: Bosque de Río Abajo, *Acevedo-Rdgz. 183* (SJ). Barranquitas: Monte Torrecilla, *N.L. Britton et al. 5604* (US). Bayamón: *Underwood 859, 860* (US). Cabo Rojo: *Sintenis 708 b* (US). Cayey: *Sintenis 2252* (US). Ciales: along trail Camino de la Ceiba towards Quebrada del Pozo Azul, *Acevedo-Rdgz. & Vicens 11848* (MAPR, UPRRP, US). Coamo: Coamo Springs, *N.L. Britton & Marble 2256* (US). Fajardo: playa de Fajardo, *N.L. Britton & Shafer 1566* (US). Guánica: *Sintenis 3798* (US). Isabela: Bo. Coto, *Proctor 45930* (SJ). Jayuya: Toro Negro State Forest. Upper W summit ridge of Cerro de Punta, *Proctor & Rivera 47081* (SJ). Manatí: Bo. Tierras Nuevas Saliente, S of Laguna Tortuguero, *Proctor & McKenzie* 44039 (SJ, US). Maricao: Maricao Insular Forest, *Otero & Gregory 802* (US). Maunabo: Punta Tuna, *Sintenis 5116* (US). Mayagüez: Mayagüez to Joyuda, *Underwood 157* (US). Río Grande: along Road 191 to El Yunque Forest Reserve, *Acevedo-Rdgz. & Siaca 9330* (UPR, US). Sabana Grande: *Sargent 436* (US). Salinas: Bo. Lapa, summit of east peak, Las Tetas de Cayey, *Proctor 43732* (SJ). San Germán: Maricao State Forest, Bo. Minillas, W side trail to Santana Peak S of Rd 362, *Proctor et al. 48069* (SJ). San Juan: Río Piedras, *Stevenson 678* (US). San Lorenzo: Bo. Espino, Carite Forest Reserve, Cerro La Santa, forest to E of radio towers, *Axelrod & Kay 11160* (US). Vieques: Lighthouse Peninsula, limestone thicket, *Shafer 2809* (US). Yauco: Susúa Forest Reserve, *Acevedo-Rdgz. 11418* (UPRRP, US). GUANA ISLAND: near head of shallow ravine just NE of Palm Ghut, *Proctor 47244* (SJ). ST. JOHN: Lameshur, *N.L. Britton & Shafer 522* (US). ST. THOMAS: Bordeaux, *E.G. Britton & Marble 1376* (US). TORTOLA: High Bush, *N.L. Britton & Shafer 821* (US). Yauco: Susúa, *Liogier 9888* (US).

2. Smilax domingensis Willd., Sp. Pl. 4: 783. 1806. Type: Hispaniola: *Richard s. n.* (holotype: P).

Figs. 16. G-K; 60. G

Slightly woody vine, 5-10 m long; stems slender, cylindrical, wiry, glabrous, smooth, without spines. Leaves alternate, simple; blades 5-12(15) × 2-6.5 cm, ovate, oblong, elliptic, or widely elliptic, chartaceous, involute, glabrous, with 5 parallel veins, the margins entire, the apex acuminate, the base obtuse, rounded, or subcordate, upper surface slightly lustrous, lower surface with prominent veins; petioles 1-1.5 cm long, articulate at base and forming a sheath that has a pair of filiform tendrils, 8-12 cm long. Inflorescence axillary, umbelliform, solitary. Perianth greenish, in staminate flowers, 3-3.5 mm long; pedicel 5-9 mm long. Berry globose, fleshy, ca. 1 cm diam., turning from green to black or purple at maturity; seed solitary.

General distribution: Mexico, Guatemala, Belize, Greater Antilles and the Virgin Islands.

Distribution in Puerto Rico and the Virgin Islands: Occasional in open disturbed areas, from low to middle elevations. Reported from Arecibo, Canóvanas, Ciales, Manatí, Maricao, Moca, Naguabo, Río Grande, San Juan, Utuado, Vega Alta, and Vega Baja; Tortola.

Common names: Puerto Rico: *Bejuco de membrillos, Raíz de zarzaparilla, Zarzaparilla.*

Selected specimens examined: PUERTO RICO: Arecibo: Bo. Río Arriba, area to NW of temporary S end of Rt. 10 (near Rt 621), adjacent to Río Abajo Forest Reserve, *Axelrod et al. 9492* (US). Canóvanas: Sierra de Luquillo, Caribbean National Forest, W end of El Toro trail, first 1.5 km from Rd 186, *Proctor & Taylor 46291* (SJ). Ciales: along trail Camino de la Ceiba towards Quebrada del Pozo Azul, *Acevedo-Rdgz. & Vicens 11835* (FTG, MAPR, NY, UPRRP, US). Manatí: Laguna Tortuguero, *Acevedo-Rdgz. & Cedeño 9488* (US). Maricao: Maricao State Forest, Bo. Maricao Afuera, N side Alto del Descanso, *Proctor et al. 48067* (SJ). Moca: *Sargent 362* (US). Naguabo: Loma Icaco, *Shafer 3449* (US). Río Grande: Sierra de Luquillo, Bo. Jiménez. Finca San Pedrito, ca.

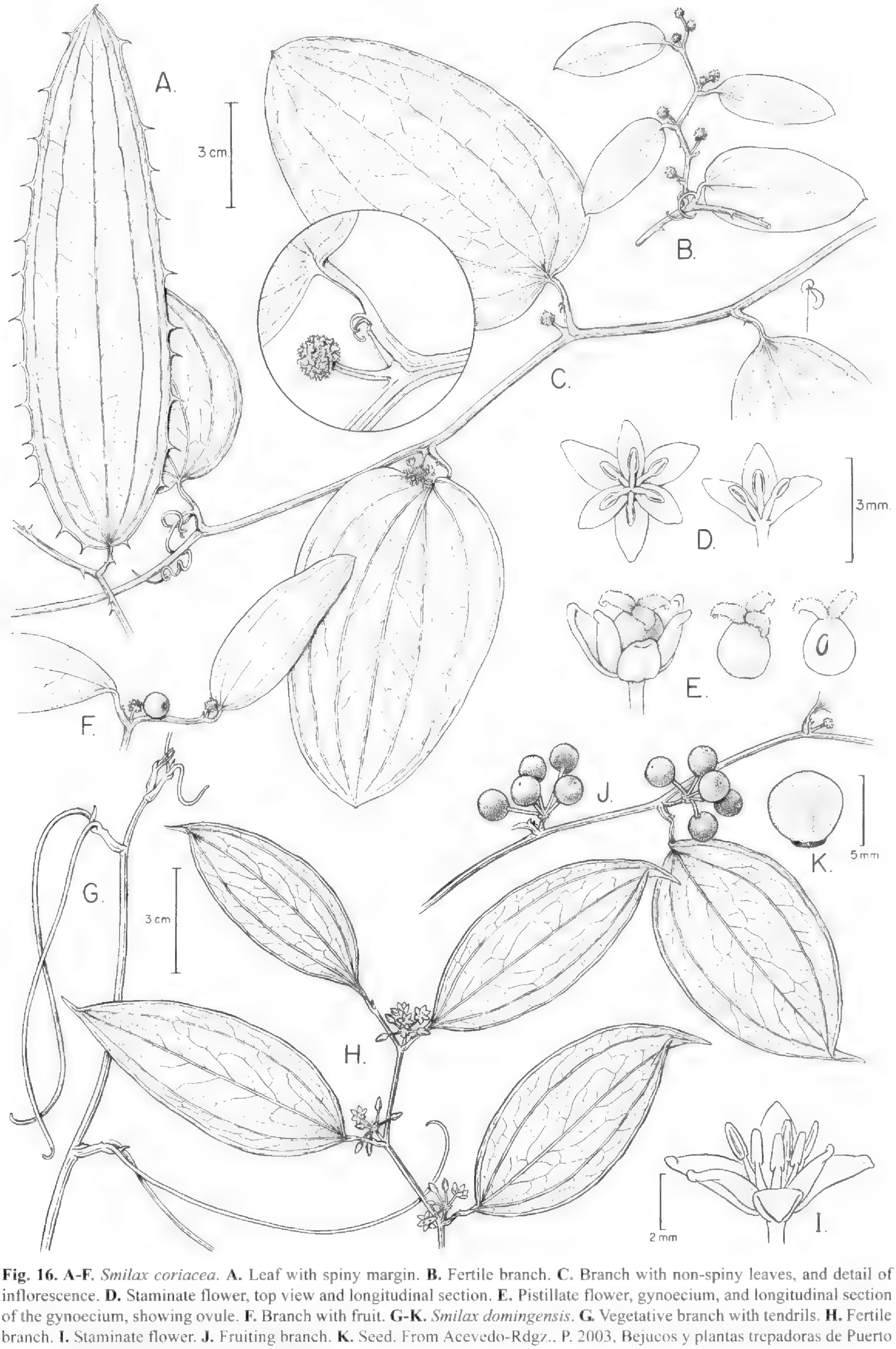


Fig. 16. A-F. *Smilax coriacea*. **A.** Leaf with spiny margin. **B.** Fertile branch. **C.** Branch with non-spiny leaves, and detail of inflorescence. **D.** Staminate flower, top view and longitudinal section. **E.** Pistillate flower, gynoecium, and longitudinal section of the gynoecium, showing ovule. **F.** Branch with fruit. **G-K.** *Smilax domingensis*. **G.** Vegetative branch with tendrils. **H.** Fertile branch. **I.** Staminate flower. **J.** Fruiting branch. **K.** Seed. From Acevedo-Rdgz., P. 2003, Bejucos y plantas trepadoras de Puerto Rico e Islas Vírgenes, Smithsonian Institution.

0.9 km due ESE of Rd 186 at El Verde, *Proctor 50442* (SJ). Río Grande: Sierra de Luquillo, in monte Jiménez, *Sintenis 1417* (US). San Juan: Río Piedras, *Stevenson 3458* (US). Utuado: Bo. Don Alonso, *Acevedo-Rdgz. et al. 7129* (UPRRP, US). Vega Alta: S of communication tower, *Acevedo-Rdgz. 12288* (US). Vega Baja: Bo. Algarrobo, *Proctor 45653* (SJ).

Excluded Species

Smilax rotundifolia L., Sp. Pl. 1030. 1753, was listed for St. Croix by Britton & P. Wilson (1923) based on a citation of O. E. Schulz, but they were not able to verify this record. There is no evidence to substantiate this record for Puerto Rico or the Virgin Islands nor has it been recently collected there. It is a species of the United States, not otherwise known to occur in the West Indies.

Family 10. **DIOSCOREACEAE** *Yam Family*

Dioscoreaceae R. Br., Prodr. 294. 1810, *nom. conserv.*

by P. Acevedo-Rodríguez

Twining vines or less often erect herbs, with thickened starchy tubers. Leaves alternate or opposite, simple or palmately compound; petioles usually jointed at base and forming a stipule-like flange. Flowers small, commonly unisexual (the plant dioecious) or less often bisexual, actinomorphic, 3-merous, in axillary racemes, spikes or panicles; perianth of 6 nearly equal tepals, usually connate at base into a short tube; stamens 6, in two cycles, sometimes the inner cycle reduced to staminodes or vestigial, the filaments distinct, sometimes adnate to the perianth tube, the anthers opening by longitudinal slits; gynoecium 3-pistillate, ovary inferior, trilocular, with axile placentation, the ovules 2 to many per locule, the styles 3, terminal, distinct, or basally connate. Fruit commonly a capsule, or less often a berry or a samara. A family of 5 or 6 genera and ca. 650 species, mostly tropical and subtropical.

TYPE: *Dioscorea* L.

References: Al-Shehbaz, I. A. & B. G. Schubert. 1989. The Dioscoreaceae in the southeastern United States. J. Arnold Arbor. 70: 57-95; Ayala Flores, F. 1998. Dioscoreaceae del Peru. Amazonian Natural Products, Iquitos Peru. 60 pages. Pedralli, G. 2004. Dioscoreaceas. *In:* A. Reis, Fl. Ilustrada Catarinense. Itajaí, Santa Catarina, Brazil, 84 pages.

Key to the genera

1. Fruit a trivalved capsule with 3, flattened locules ..... 1. *Dioscorea*
1. Fruit a unilocular, flattened samara with a distal wing ..... 2. *Rajania*

1. DIOSCOREA

Dioscorea L, Sp. Pl. 1032. 1753.

Dioecious, twining, herbaceous to woody vines, with large, single or clustered tubers; stems cylindrical, angled or winged, armed or unarmed. Leaves alternate or opposite, simple or palmately lobed, with arching parallel veins, long-petiolate, usually with aerial bulbils in axils. Flowers unisexual, 3-merous, actinomorphic, in axillary spikes, racemes or panicles. Perianth minute; staminate flowers with 6 stamens, all fertile or the inner cycle modified into staminodes; pistillate flowers bearing staminodes and an inferior ovary. Fruit a dry, chartaceous to leathery, 3-winged capsule; seeds numerous, flattened, winged. A tropical and subtropical genus of about 600 species, 10 of which are the source of edible *yams*

or tubers.

LECTOTYPE: *Dioscorea sativa* L., designated by Britton & A. Brown, Ill. Fl. U.S. ed. 2, 1: 535. 1913.

References: Burkill, H. M. 1985. The useful plants of west tropical Africa. Vol. 1. Royal Botanic Garden, Kew. Coursey, D. G. 1967. Yams. An account of the nature, origins, cultivation and utilization of the useful members of Dioscoreaceae. Longmans, London. Prain D. & I. H. Burkill. 1919. *Dioscorea sativa*. Bull. Misc. Inform. Kew 9: 339-375. Caddick, L.R., P. Wilkin, P.J. Rudall, T.A.J. Hedderson, & M.W. Chase. 2002. Yam reclassified: a recircumscription of Dioscoreaseae and Dioscoreales. Taxon 51: 103-114.

Key to the species of *Dioscorea*

1. Stems mostly quadrangular or 4-winged (cylindrical at base in *D. alata*) 2
   2. Leaves opposite, entire ..... 1. *D. alata*
   2. Leaves alternate, 3- to 6-lobed ..... 7. *D. trifida*
1. Stems cylindrical or trigonous, not winged 3
   3. Leaves abaxially pilose along veins ..... 5. *D. pilosiuscula*
   3. Leaves glabrous 4
      4. Stems acutely triangular, spiny ..... 2. *D. altissima*
      4. Stems cylindrical 5
         5. Stems usually spiny; leaves opposite ..... 4. *D. cayennensis*
         5. Stems not spiny; leaves alternate 6
            6. Staminate flowers in lateral cincinni; fertile stamens 3; bulbils angulate, smooth; petiole slightly winged at base, not clasping the stem to form a pseudostipule ..... 6. *D. polygonoides*
            6. Staminate flowers along raceme axes, not grouped in cincinni; fertile stamens 6; bulbils rounded, verrucose; petiole winged at base, the wing clasping the stem to form a circular pseudostipule ..... 3. *D. bulbifera*

1. Dioscorea alata L., Sp. Pl. 1033. 1753. Type: India. (LINN-1184.2).

Rajania flexuosa Bello, Anales Soc. Esp. Hist. Nat. 12: 124. 1883. Type: Puerto Rico. *Bello, s. n.* (destroyed).

Fig. 17. A-E

Herbaceous twining vine, 10-15 m long; stems slender, glabrous, 4-winged; old basal stems slightly woody, cylindrical, and spiny. Leaves mostly opposite; blades 6-26 (-30) × 4-18 cm, widely ovate, coriaceous, glabrous, with 5-7 parallel veins, upper surface lustrous, with sunken veins, lower surface dull, with prominent veins, the apex acute or acuminate, sometime reflexed, the base cordate, the margins entire; petioles 4-12 cm long, 4-winged, forming an auriculate sheath (pseudostipules) around the stem; bulbils axillary, elongated, pendent, to 15 cm long. Inflorescences axillary, unisexual, hanging; staminate inflorescences a panicle 5-15 cm long, with numerous lateral, flexuous, densely-flowered spikes; pistillate inflorescences simple, 9-25 cm long, in distant- to approximate-flowered spikes. Perianth of staminate flowers 1-1.5 mm long; perianth of pistillate flowers 2-2.8 mm long. Capsule 3-winged, 2-3 cm diam.; each locule 2-seeded.

General distribution: Native of southeast Asia, but widely cultivated and naturalized throughout the tropics.

Distribution in Puerto Rico and the Virgin Islands: Previously widely cultivated for its edible tubers, now commonly naturalized in disturbed and secondary forests of moist areas. Recorded for Adjuntas, Aguada, Arecibo, Cataño, Cayey, Isabela, Maricao, Mayagüez, Quebradillas, Río Grande, Sabana Grande, San Juan, Toa Baja, Vega Baja, and Villalba; St. John.

Common names: Puerto Rico: *Ñame, Ñame de agua, Ñame blanco;* Virgin Islands: *Red yam, Water yam, and White yam.*

Selected specimens examined: PUERTO RICO: Adjuntas: *Sintenis 4509* (US). Aguada: Bo.

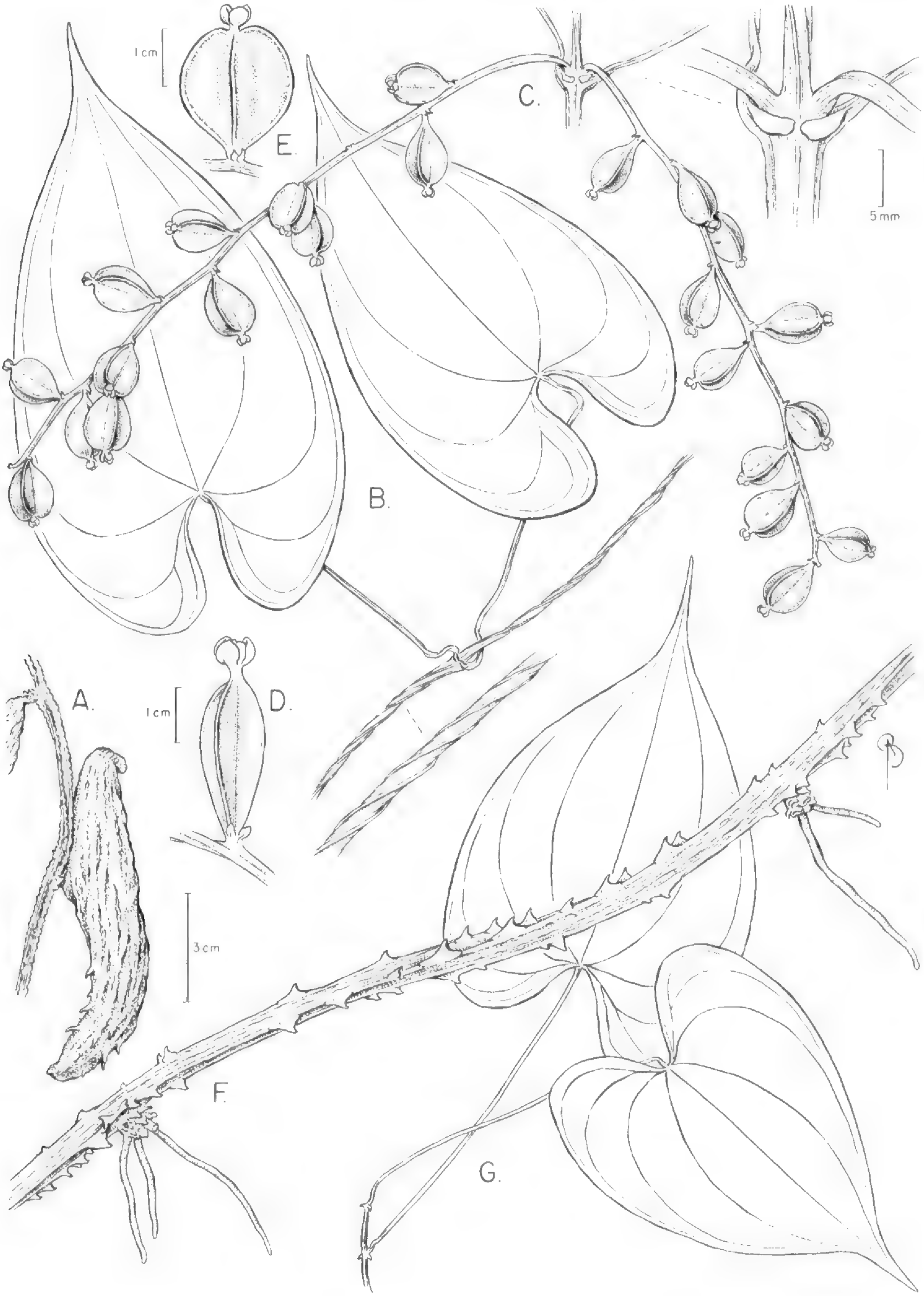


Fig. 17. A-E. *Dioscorea alata.* **A.** Axillary bulbil. **B.** Sterile branch, with detail of the stem. **C.** Infructescences, with detail of pseudostipules. **D.** Immature fruit. **E.** Mature fruit. **F-G.** *Disocorea altissima.* **F.** Mature stem, with adventitious roots. **G.** Leaves. From Acevedo-Rdgz., P. 2003, Bejucos y plantas trepadoras de Puerto Rico e Islas Vírgenes, Smithsonian Institution.

Guaniquilla, just SSE of Rd 441, km 1.5, *Proctor* 47513 (SJ). Arecibo: Santa Ana, *Goll 137* (US). Cataño: *Goll 1066* (US). Isabela: Agr. Exp. Sta., *Almeyda s.n.* (US). Maricao: Bo. Indiera Fría, along track near Río Lajas below El Salto de Curet, *Proctor & Padrón 45679* (SJ). Mayagüez: Bo. Montoso. Road 119, km 21.3, *Breckon & Pteridology class 6282* (US). Quebradillas: *Sargent B48* (US). Río Grande: Caribbean National Forest, entrance to El Verde area, *Acevedo-Rdgz. & Siaca 7076* (US). San Juan: Río Piedras, *Underwood & Griggs 358* (US). Toa Baja: Bo. Candelaria, 0.4-0.7 km WSW of Pico Nevárez, *Proctor & Thomas 45574* (SJ). St. John: Bordeaux Mountain, *Woodbury 461/6915* (VINPS).

2. Dioscorea altissima Lam., Encycl. 3: 233. 1789. Lectotype: Martinique (?). *Surian s.n.*, (P 00307100), designated by Pedralli in A. Reis, Fl. Ilustr. Catarinense. 12. 2004.

Fig. 17. F, G

Semi-woody, glabrous, twining vine, 10-15 m long; stems smooth, angled or triangular, to 1.5. cm wide, with recurved spines ca. 1 cm long. Leaves alternate or less often subopposite; blades 8-16 × 7-16 cm, ovate or sub-orbicular, coriaceous, glabrous, with 7-9 parallel veins, the apex shortly acuminate to caudate, the base cordate, the margins slightly undulate; petioles slender, 6-15 cm long, sometimes minutely spiny, swollen at both ends, forming a pair of spiny pseudostipules at base; bulbils axillary, ellipsoid, elongated, pendent, scaly. Inflorescences axillary, of simple spikes; pistillate inflorescences longer than the staminate ones. Perianth of oblong segments. Capsule 3-winged, ca. 3 × 1.5 cm

General distribution: Hispaniola, Puerto Rico, Lesser Antilles, northern South America to southern Brazil and Bolivia.

Distribution in Puerto Rico: Apparently native, occasional in moist forests in low or medium elevations. Cayey, Juncos, Luquillo, Manatí, Río Grande, and Yabucoa.

Common names: Puerto Rico: *Ñame dunguey, Dunguey.*

Selected specimens examined: Puerto Rico: Luquillo: Bo. Sabana, Caribbean National Forest, *Axelrod et al. 10051* (US). Juncos: Monte Santo de León, *Sintenis 2495* (US). Manatí: Coto Sur, Poblado Polvorín, *Acevedo-Rdgz. 12296* (US). Yabucoa: *Sintenis 5176* (US).

After studying an image of the type of *Dioscorea altissima*, discovered just as this project was concluding, I got the impression that what has traditionally been called *D. altissima*, is a different species from the type of that name. Although the available descriptions of *D. altissima* portray the species as quite variable, the image of its type suggests it to be conspecific with *D. cayennensis*. Further studies are needed to clarify whether the type of *D. altissima* represents a distinctive species or the same as *D. cayennensis*. If the type of *D. altissinma* is indeed conspecific with *D. cayennensis*, the species that traditionally has been called *D. altissima* in the West Indies needs a different name. Alternatively, the name *D. altissima* could be proposed for conservation with a new type that would preserve its traditional usage.

3. Dioscorea bulbifera L., Sp. Pl. 1033. 1753. Type: India. *Hermann, Parad. Bat. t. 217. 1698,* designated by Milne-Redhead in Polhill, Fl. Trop. E. Afr. Dioscor. 10. 1975.

Fig. 18. A-E

Herbaceous, glabrous, twining vine, 8-10 m long; stems terete, smooth, unarmed. Leaves alternate; blades 9-12.5(17) × 5.5-11(15.5) cm, ovate, chartaceous, glabrous, with 9-11 parallel veins, the apex acuminate to caudate, the base cordate, the margins slightly undulate; petioles (4)12-15 cm long, winged and projecting as a pair of pseudostipules surrounding the stem at base; bulbils axillary, rounded, 5-6 cm wide, verrucose. Inflorescences axillary, simple fasciculate; staminate inflorescences usually paired, 9-15 cm long, the flowers in lateral, stipitate cincinni; pistillate inflorescences ca. 12 cm long, with solitary flowers. Flowers diminutive, sessile, white or pinkish tinged; staminate flowers with perianth ca. 1.2 mm long and 6 fertile stamens; pistillate flowers with perianth ca. 1.4 mm long and a hypanthium ca. 2 mm long. Capsules 3-winged, ca. 2.5 cm long.

General distribution: Native to the Old World tropics, but introduced and naturalized in the Neotropics.

Distribution in Puerto Rico: Locally common in secondary moist forests of low and medium

elevations. Collected in Arecibo, Río Grande, and Vega Alta.

Common name: Puerto Rico: *Gunda.*

Selected specimens examined: PUERTO RICO: Arecibo: 0.5 km S of Biáfara, *Acevedo-Rdgz. & Siaca 11701* (US). Vega Alta: Bo. Sabana, NE of Regadera, *Proctor & Concepción 45791* (SJ-2).

4. Dioscorea cayennensis Lam., Encycl. Méth. Bot. 3: 233. 1789. Holotype. French Guiana; Cayenne. *Stoupy s.n.* (P-LAM-270403).

Fig. 18. F-K

Slightly woody vine, twining (toward the right), glabrous, attaining 10 m in length. Stems flexible, cylindrical, usually with recurved spines. Leaves opposite, simple, more or less ascendant, coriaceous, ovate, 7-veined, 6-14 × 5-10 cm, the apex abruptly acuminate, the base cordiform to almost truncate, the margins entire, revolute; upper surface shiny, with the venation slightly sunken; lower surface dull, with translucent lines, the primary venation prominent; petioles 4.5-12 cm long, pulvinate at both ends. Inflorescences axillary, fragrant, unisexual, in pendulous spikes, the staminate ones fasciculate, the pistillate ones solitary. Staminate flowers with the perianth 2-2.5 mm long, the stamens 6, all fertile; pistillate flowers with the perianth 1-1.5 mm long. Capsule elliptic-oblong in outline, 1.7 cm long. Seeds with a basal wing.

General distribution: Although this species was described based on material from French Guiana, it is native to western Africa, where it has been cultivated for centuries (Burkill, 1985). Today it is cultivated throughout the tropics, where is has become naturalized.

Distribution in Puerto Rico: In areas of disturbed or secondary vegetation. Collected in Bayamón, Mayagüez, and San Sebastián.

Common name: Puerto Rico: *Ñame de Guinea.*

Selected specimens examined: PUERTO RICO: Without locality, *Goll s.n.* (US). Bayamón: *Underwood & Griggs 1003* (US). Mayagüez: *Kinman s.n.* (US). San Sebastián: *Sargent 370* (US).

5. Dioscorea pilosiuscula Bertero ex Spreng., Syst. Veg. 2: 152. 1825. Type: Hispaniola. *Bertero s. n.* (holotype: probably at TO).

Fig. 18. L-P

Slender, herbaceous twining vine, 2.5-8 m long; stems slender, wiry, glabrous or puberulent, cylindrical to slightly angled, unarmed. Leaves alternate; blades 4.5-12.5 × 2.5-6.5 cm, oblong-ovate to ovate, chartaceous, minutely pilose along veins below, with 5-7 parallel veins, the apex acuminate, the base cordate, the margins entire; petioles 1-4 cm long, slender, furrowed and swollen at both extremities; bulbils paired in leaf axils, ovoid, verrucose, 2.5-3 cm long. Inflorescences axillary; staminate inflorescences of 1-4 clustered spikes, 15-30 cm long; pistillate inflorescence a solitary spike, 9.5-30 cm long. Perianth of pistillate flowers 1.5-2 mm long. Capsule oblong, 3-winged, 1-2.5 cm long. Seeds ca. 8 mm long, with a basal wing.

General distribution: Greater Antilles, Lesser Antilles, and South America

Distribution in Puerto Rico and the Virgin Islands: Occasional in open disturbed areas. Reported for Arecibo, Isabela, Luquillo, Moca, Naguabo, Río Grande, San Juan, Utuado, and Vega Baja, Yabucoa; St. John, St. Thomas and Tortola.

Common name: Puerto Rico: *Dunguey.*

Selected specimens examined: PUERTO RICO: Isabela: Guajataca State Forest, *Raz 184* (NY). Moca: *Sargent 401* (US). Naguabo: Sierra de Naguabo, *Sintenis 5353* (US). San Juan: Río Piedras, *Stevenson 2466* (US). ST. JOHN: Bethany, *N.L. Britton & Shafer 348* (NY, US); Coral Bay Quarter; Center Line Road, *Acevedo-Rdgz. & Siaca 3991* (COL, F, JBSD, MICH, MO, NY, UPR, TEX, US, VINPS). ST. THOMAS: St. Peter, *Eggers s.n.* (US); *E.G. Britton & Marble 1242* (US). Tutu, *N.L. Britton & E.G. Britton 451* (US). TORTOLA: Potwood Pond to West End, *Shafer 1183* (US).

6. Dioscorea polygonoides Humb. & Bonpl. ex Willd., Sp. Pl. 4: 795. 1806. Type: Venezuela; Orinoco River. *Humboldt & Bonpland s. n.* (holotype: B-W; isotype: P-HBK, photo at US!).

Fig. 19. A-I

Herbaceous twining vine, 8 or more m long; stems glabrous, cylindrical, unarmed. Leaves alternate; blades (3)8-21 × (2)5-17 cm, ovate, chartaceous, glabrous, with 7-11 parallel veins, the apex acuminate, the base cordate, the margins

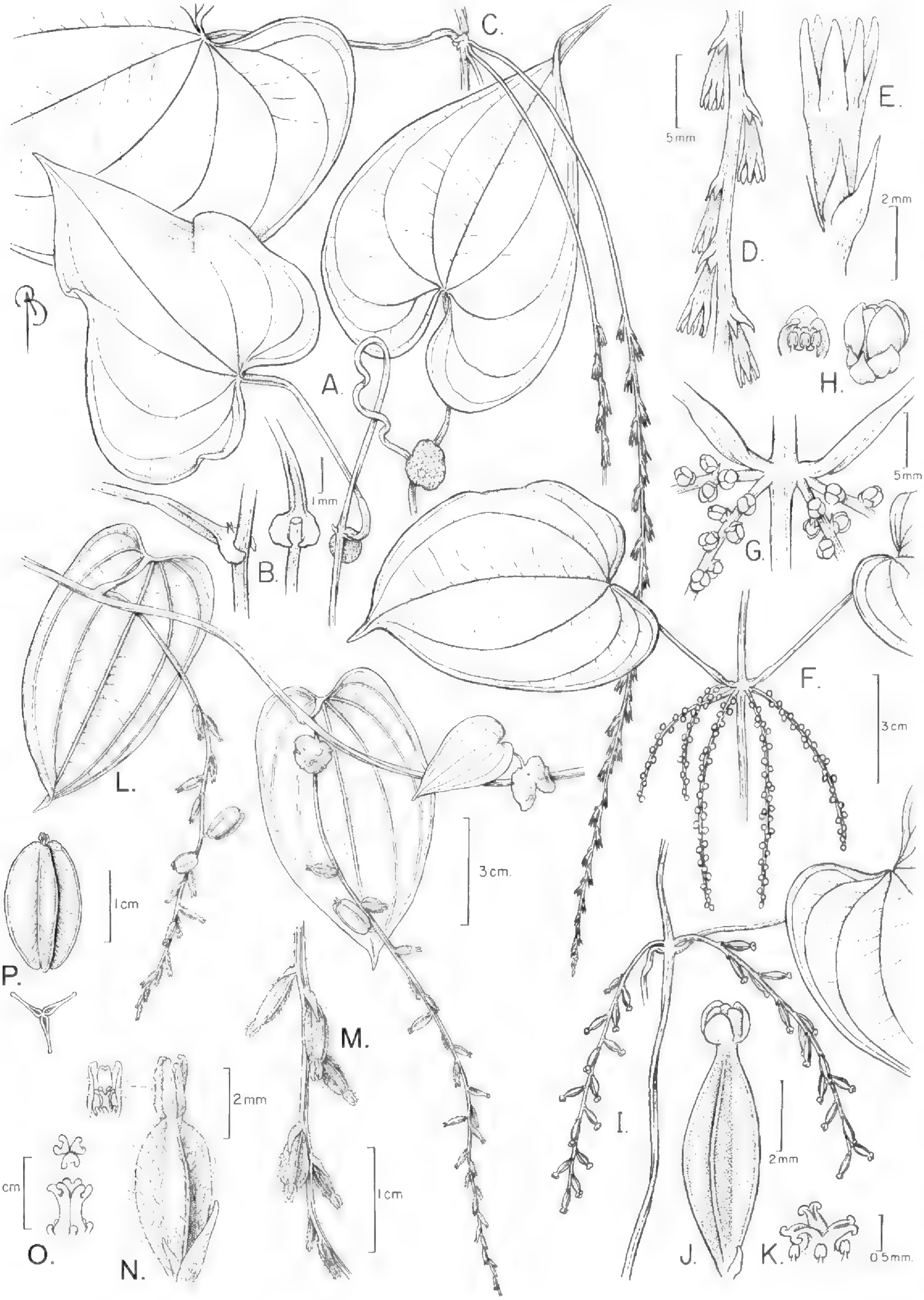


Fig. 18. A-E. *Dioscorea bulbifera.* **A.** Sterile branch, with axillary bulbils. **B.** Pseudostipules. **C.** Fertile branch. **D.** Pistillate inflorescence. **E.** Pistillate flower. **F-K.** *Disocorea cayennensis.* **F.** Fertile branch. **G.** Inflorescences. **H.** Staminate flower. **I.** Infructescences. **J.** Immature fruit. **K.** Stigmas and staminodia. **L-P.** *Dioscorea pilosiuscula.* **L.** Fertile branch, with axillary bulbils. **M.** Detail of infructescence. **N.** Immature fruit, with detail of the flower, showing stigmas and staminodia. **O.** Stigmas, side and top views. **P.** Fruit, side view and cross section. From Acevedo-Rdgz., P. 2003, Bejucos y plantas trepadoras de Puerto Rico e Islas Vírgenes, Smithsonian Institution.

entire; petioles (1.5)5-8 cm long, slender, marginate at base but not extending as a pseudostipule; bulbils angled, to 5 cm wide, smooth. Inflorescences axillary, hanging, unisexual; staminate inflorescences solitary or paired, simple or less often branched, to 50 cm long, with flowers in lateral cincinni; pistillate inflorescence a solitary, simple spike, with solitary flowers along the axis. Flowers ca. 1 mm long, sessile, white or greenish; staminate flowers with 3 fertile stamens; pistillate flowers hypanthium ca. 2 mm long. Capsule elliptic, 3-winged, 2-3.6 cm long; seeds 2 per locule, orbicular, ca. 5 mm in diam.

General distribution: Tropical America including the Antilles.

Distribution in Puerto Rico: Common in moist secondary forests and disturbed habitats. Recorded from Arecibo, Bayamón, Caguas, Ceiba, Guaynabo, Luquillo, Maricao, Naguabo, Río Grande, Toa Baja, and Vega Baja.

Common names: Puerto Rico: *Gunda, Hícamo, Matagallina.*

Selected specimens examined: PUERTO RICO: Bayamón: Bo. Guaraguao Arriba, along Rd 879 ca. 1 km WSW of Cerro La Peña, *Proctor & Thomas 44550* (SJ). Caguas: Beatriz de Caguas, *Goll 441* (US). Ceiba, *N.L. Britton & Shafer 1544* (US). Guaynabo: Bo. Sonadora, upper N slopes of Cerro Marquesa, *Proctor 43537* (SJ, US). Luquillo: Sierra de Luquillo, Caribbean National Forest, Bo. Sabana, *Proctor & Thomas 44646* (SJ). Naguabo: Sierra de Naguabo, *Shafer 3569* (US). Río Grande: Sierra de Luquillo, Caribbean National Forest, Rd 191, km 9.9, Quebrada Juan Diego, *Proctor 46230* (US), *46233* (US), *46234* (SJ, US). Toa Baja: Bo. Candelaria, *Proctor 45456* (SJ).

7. Dioscorea trifida L. f., Suppl. Pl. 427. 1782 ["1781"]. Holotype: Surinam. *Allamand s.n.* (LINN-1184.1).

Fig. 19. J-L

Herbaceous twining vine; stems glabrous or puberulent, obtusely 4-angled, striate or 4-winged, unarmed. Leaves alternate; blades palmate or 5-lobed, 12-21 × 14-25 cm, ovate in outline, membranous, with 9-11 parallel veins, upper surface glabrous, with slightly prominent venation, lower surface puberulent, especially along the prominent veins, the lobes ovate-lanceolate, acuminate at apex, the base cordate, the margins entire or slightly undulate; petioles 5-19 cm long, 4-winged, glabrous, pulvinate at base not forming a pseudostipule; bulbils not known. Inflorescences axillary, unisexual; staminate inflorescences paniculate, with flowers in lateral, sessile cymes; pistillate inflorescence racemose, with solitary flowers along the axis. Staminate flowers cream, 1.5-6 mm long, with 6 fertile stamens; pistillate flowers 2.5-3.4 mm long, with pubescent hypanthium. Capsule oblong-elliptic, 2.5-3.4 cm long.

General distribution: Apparently native to South America but now spread throughout the Antilles.

Distribution in Puerto Rico: Cultivated for its edible tubers and apparently naturalized. Recorded from Moca.

Common names: Puerto Rico: *Mapuey, Ñame mapuey, Ñame morado, Ñame vino.*

Selected specimens examined: PUERTO RICO: Mayagüez: Agricultural Experimental Station, cultivated, *coll. unknown s.n.* (US). Moca: *Sargent 500* (US).

Cultivated Species

Dioscorea floribunda M. Martens & Galeotti, *D. friedrichsthalli* R. Knuth, *D. latifolia* Benth., *D. rotundata* Poir., and *D. sativa* L. are cultivated in Puerto Rico, but they do not appear to have become naturalized.

2. RAJANIA

Rajania L., Sp. Pl. 1032. 1753.

Dioecious, twining, herbaceous vines, with elongated, deep-rooted tubers; stems cylindrical, unarmed. Leaves alternate, simple, with arching parallel veins; petiolate. Inflorescences axillary. Flowers unisexual, the perianth minute, 6-merous, actinomorphic; staminate flowers with 6 fertile stamens, usually produced in lateral cymes along a racemiform thyrse; pistillate flowers produced in axillary racemes. Fruit a dry, indehiscent samara with a distal wing. An Antillean genus of about 25 species.

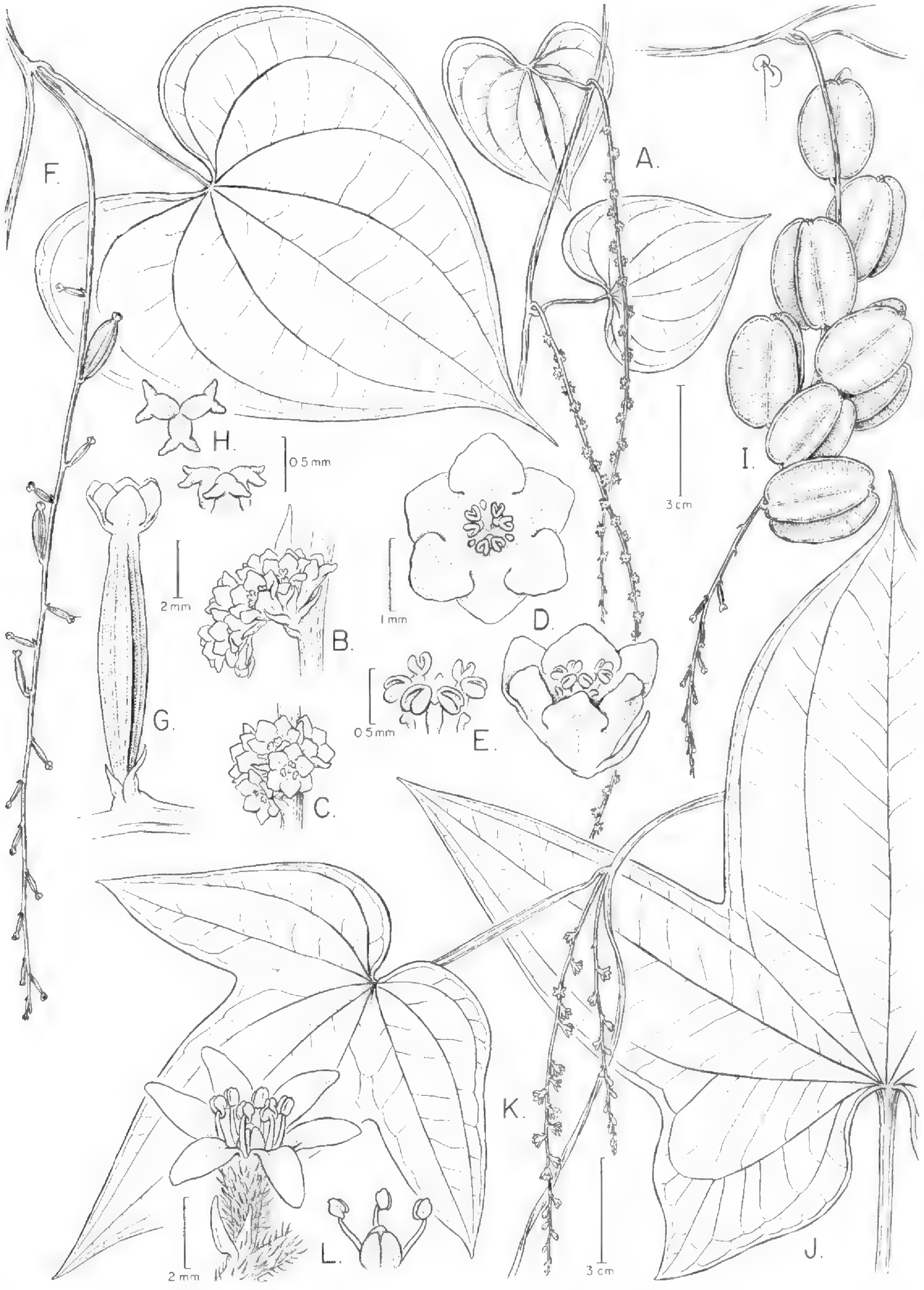


Fig. 19. A-I. *Dioscorea polygonoides.* **A.** Branch with staminate inflorescences. **B.** Cincinnus with staminate flowers, side view. **C.** Cincinnus with staminate flowers, front view. **D.** Staminate flower, top view. **E.** Stamens, staminate flower, side view. **F.** Branch with pistillate inflorescence. **G.** Pistillate flower. **H.** Stigmas. **I.** Infructescence. **J-L.** *Disocorea trifida.* **J.** Leaf. **K.** Fertile branch. **L.** Staminate flower, and detail of the stamens and pistillode. From Acevedo-Rdgz., P. 2003, Bejucos y plantas trepadoras de Puerto Rico e Islas Vírgenes, Smithsonian Institution.

Rajania was merged into *Dioscorea* by Caddick et al. (2002) based on cladistic analyses of molecular and morphological characters that suggest that *Rajania* is nested within *Dioscorea*. They argue for the recognition of strictly monophyletic groups and thus do not recognize *Rajania* at the generic level. The present writer prefers to treat *Rajania* at the generic level as it seems to be monophyletic (within *Dioscorea*) and it is distinguishable by its indehiscent samaras.

LECTOTYPE: *Rajania hastata* L., designated by Britton & Millspaugh, Bahamas Fl. 80. 1920.

1. Rajania cordata L., Sp. Pl. 1032. 1753. Lectotype: West Indies. Plate 491 of the Boerhaave set of Plumier illustrations at the library of Rijksuniversiteit, Groningen, here designated.

Rajania sintenisii Uline in Urban Symb. Antill. 3: 281. 1902. Type: Puerto Rico. *Sintenis 109* (holotype: B, destroyed).

Rajania cordata var. *microcarpa* Uline ex R. Knuth, Notizbl. Bot. Gart. Berlin-Dahlem. 7: 219. 1917. Syntypes: Puerto Rico. *Sintenis 109b, 1384* (B, destroyed); St. Thomas, U.S. Virgin Islands. *Eggers 184, 2893* (C?); Cuba. *Wilson & León 11551* (NY!).

Rajania venosa R. Knuth, Notizbl. Bot. Gart. Berlin-Dahlem. 7: 219. 1917. Type: Puerto Rico. *P. Wilson 163* (holotype: NY, isotype: US!).

Figs. 20. A-L; 60. I

Herbaceous twining vine; stems glabrous, wiry, cylindrical. Leaves alternate; blades 4-11.5(20) × 2-6.5(12) cm, ovate, lanceolate or less frequently hastate, coriaceous, with 5 to 9 parallel veins, glabrous, the apex acute or acuminate, the base cordate or subtruncate, the margins entire; petioles 2-7 cm long, cylindrical, pulvinate at base, not forming a pseudostipule. Inflorescences axillary, unisexual; staminate inflorescences solitary or fasciculate, 4-25 cm long, with 1-3 lateral, stipitate cymes per node; pistillate inflorescence racemose, 4-30 cm long, with solitary flowers along the axes. Flowers white or cream; staminate flowers 0.9-1.1 mm long, with 6 fertile stamens; pistillate flowers 1-1.3 mm long, the hypanthium ca. 1.5 mm long. Samara (1.1)1.6-3.2 cm long, laterally flattened, usually reddish tinged.

General distribution: Widely distributed throughout the Antilles.

Distribution in Puerto Rico and the Virgin Islands: Common in humid or wet forests throughout the Cordillera Central and the karst limestone region. Recorded from Adjuntas, Aguadilla, Arecibo, Barranquitas, Bayamón, Cayey, Ciales, Cidra, Fajardo, Guayama, Isabela, Jayuya, Lares, Luquillo, Manatí, Maricao, Mayagüez, Naguabo, Peñuelas, Ponce, Quebradillas, Río Grande, Sabana Grande, Salinas, San Germán, Utuado, Vega Alta, Vieques, Villalba, and Yauco; St. Croix, St. Thomas.

Common names: Puerto Rico: *Ñame gulembo, Guáyaro, Bejuco de guaraguao.*

Selected specimens examined: PUERTO RICO: Adjuntas: Cordillera Central, Bo. Saltillo, 0.8 km due SW of Alto de la Bandera, *Proctor 42125* (SJ). Aguadilla: Bo. Caimital Bajo, *Acevedo-Rdgz. et al. 13437* (MAPR, US). Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 11381* (US). Barranquitas: Bo. Barrancas, upper NE slopes and summit of Monte La Torrecilla, *Proctor & Colón 50330* (SJ). Bayamón: Bo. Guaraguao Arriba, upper slopes and summit of Cerro La Peña, *Proctor & Díaz 41862* (SJ); Hato Tejas, *Goll 238* (US). Cayey: Carite Forest Reserve, Cerro La Santa, *Acevedo-Rdgz. 7927* (US). Ciales: along Road 149, *Acevedo-Rdgz. & Alvarez 2977* (US). Cidra: Bo. Salto, uppermost slopes and summit of El Peñon, *Proctor et al. 47634* (SJ). Fajardo: *N.L. Britton & Shafer 1732* (US). Guayama: Carite Reserve, vicinity of Guavate Recreational Area, *Wasshausen 1316* (US). Isabela: Reserva Forestal Bosque Guajataca, La Caballa Trail, *Acevedo-Rdgz. & Siaca 11735b* (US). Jayuya: Bo. Veguitas, upper NW slope of Piedra Blanca, *Proctor & Haneke 41031* (SJ). Lares: *Underwood & Griggs 40* (US). Manatí: Bo. Tierras Nuevas Saliente, area just S of Laguna Tortuguero, *Proctor 42698* (SJ); Mango Hill, at end of road from Adventist camp, *Axelrod & Nir 11069* (US). Maricao: Bo. Indiera Fría, mountain ridge E of Río Postrero, just E of State Forest boundary, *Proctor et al. 45221* (SJ). Mayagüez: Cerro de Las Mesas, *N.L. Britton & Hess 2693* (US); Naguabo: Sierra de Naguabo, El Duque, NW side and summit, *Shafer 3655* (US). Peñuelas: *Sintenis 4526* (US). Ponce: Toro Negro State Forest, along headwaters of Río Inabón

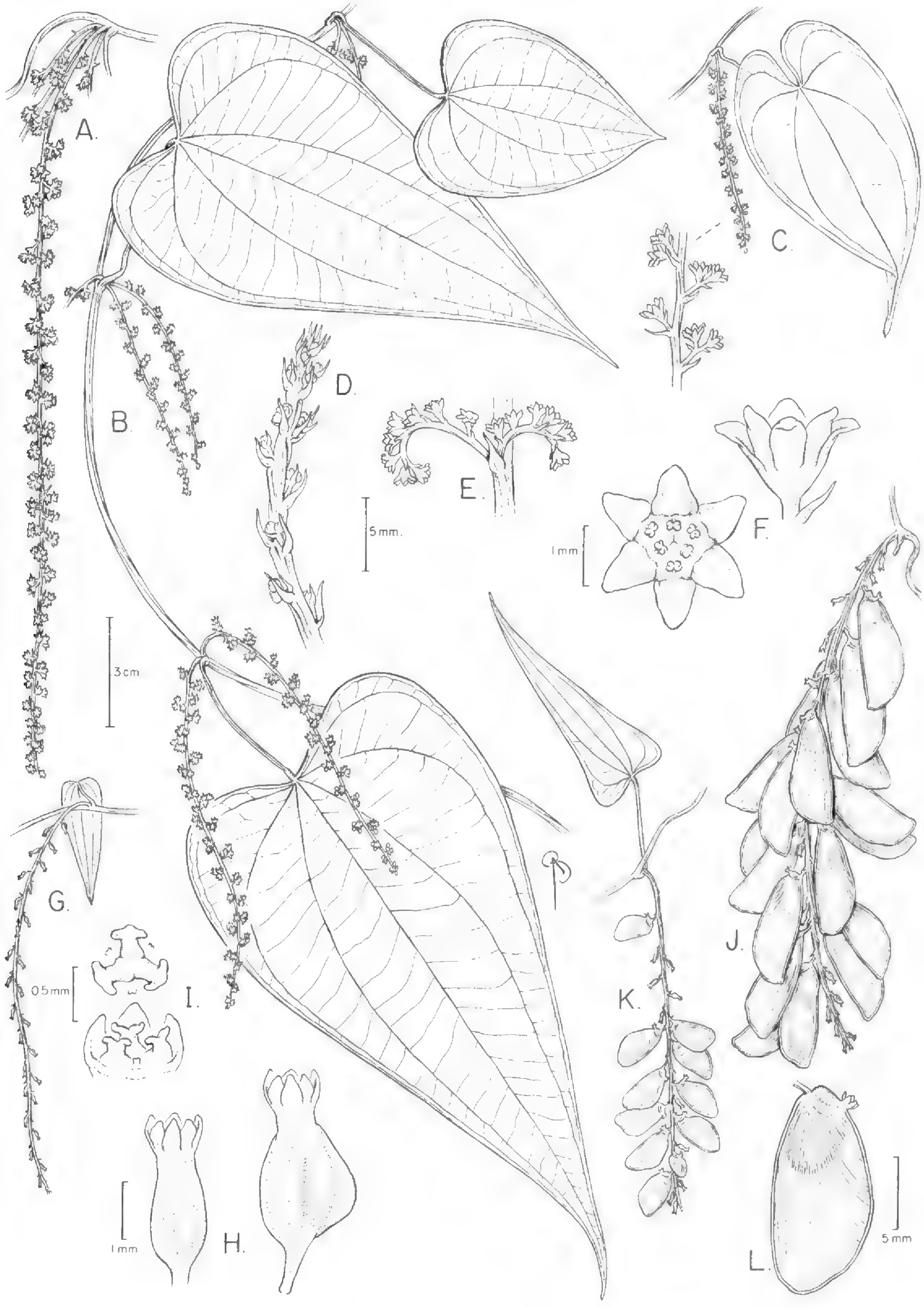


Fig. 20. A-L. *Rajania cordata.* **A.** Staminate inflorescence. **B.** Fertile branch. **C.** Branch with racemose inflorescence. **D.** Distal portion of inflorescence. **E.** Detail of cincinnus. **F.** Staminate flower, top and side views. **G.** Branch with pistillate inflorescence. **H.** Pistillate flower, not fertilized and fertilized. **I.** Stigmata, top and side views. **J-K.** Infructescence. **L.** Samaroid fruit. From Acevedo-Rdgz., P. 2003, Bejucos y plantas trepadoras de Puerto Rico e Islas Vírgenes, Smithsonian Institution.

above high falls, *Proctor 40073* (SJ). Quebradillas: Guajataca Forest, *Acevedo-Rdgz. & Chinea 5226* (US). Río Grande: Caribbean National Forest, El Yunque, *Acevedo-Rdgz. 7101* (UPRRP, US). Sabana Grande: Maricao State Forest, Bo. Santana, S slopes of Monte Padrón, *Proctor & Padrón 41807* (SJ). Salinas: Bo. Lapa, summit of E peak, Las Tetas de Cayey, *Proctor & McKenzie 44073* (SJ). San Germán: Maricao State Forest, vicinity of Campamento Buena Vista, *Proctor & Padrón 41906* (SJ). San Juan: Río Piedras, *Stevenson 158* (US). Utuado: Bo. Don Alonso, *Acevedo-Rdgz. 13412* (US). Vieques: Isabel Segunda to Martineau, *Shafer 2631* (US). Vega Alta: Espinosa, *Stevenson 3113* (US). Vega Baja: *Goll 1033* (US). Villalba: Toro Negro Forest, crest of Cordillera Central SW of Cerro Doña Juana, *Webster et al. 8738* (US). Yauco: Susúa Forest Reserve, *Acevedo-Rdgz. 11406* (US). St. Thomas: Crown Mountain, *Acevedo-Rdgz. 11208* (US).

Family 11. **BURMANNIACEAE** *Burmannia Family*

Burmanniaceae Blume, Enum. Pl. Javae 1: 27. 1827, *nom. conserv.*

by G. R. Proctor

Saprophytic or sometimes autotrophic small herbs. Rhizomes often present, these covered with minute scale-like leaves; roots filiform, lacking root-hairs. Stems erect, usually unbranched, white or variously colored. Leaves alternate, sessile, simple, entire, in saprophytic species minute and scale-like, but in autotrophic species sometimes rather large and often rosulate. Inflorescence a terminal, 1- to many-flowered cyme, this open and few-flowered to compact or dense, usually bifurcate. Pedicels usually distinct. Flowers bisexual, sympetalous, usually actinomorphic, white or variously colored, consisting of a basal tubular part and 6 tepals, these arranged in 2 whorls; floral tube sometimes winged or ribbed. Stamens 3 or 6, erect or pendent, inserted in the floral tube just below and opposite the inner whorl of tepals, the filaments mostly very short; anthers transversely or longitudinally dehiscent. Style 3-branched at the apex, each branch opposite an outer tepal and bearing a variously-shaped stigma; nectaries often present. Ovules many, very small. Fruit a capsule, transversely or longitudinally dehiscent by slits or valves, or sometimes opening irregularly by withering of the fruit wall. Seeds many, very small. A pantropical family of 15 genera and ca. 125 species, occurring also in subtropical to temperate areas such as southern China, Japan, northern Australia, Tasmania, and New Zealand. The Neotropical area is credited with 10 genera, 54 species, and three subspecies.

TYPE: *Burmannia* L.

References: Jonker, E. P. 1938. A monograph of the Burmanniaceae. Utrecht. Maas, P. J. M. et al. 1986. Burmanniaceae. Fl. Neotrop. Monogr. 42: 1-189. Maas, P. J. M. & H. Maas. 1990. Flora vascular de La Española: Burmanniaceae. Moscosoa 6: 134-139.

Key to the genera

1. Non saprophytic herbs with small or minute green leaves; flowers clustered in a small dense head ..... 2. *Burmannia*
1. Saprophytic herbs without chlorophyll; flowers solitary, loosely cymose, or scattered, not in dense heads 2
    2. Flowers usually purple, funnel-shaped; tepals persistent in fruit ..... 1. *Apteria*
    2. Flowers white at anthesis, salverform, tepals deciduous, soon falling, leaving a naked floral tube ..... 3. *Gymnosiphon*

1. APTERIA

Apteria Nutall, J. Acad. Nat. Sci. Philadelphia (7): 64. 1834.

Erect, saprophytic herb with small, slightly tuberous, cylindrical rhizome, densely covered with minute, ovate-triangular imbricate scales and filiform roots. Stems with one terminal flower or few to several, scattered, axillary, erect or nodding flowers, these funnel- to salver-shaped. Inner tepals on a crescent-shaped outgrowth of the floral tube, each filament abaxially bearing a 2-lobed wing; anthers dehiscing transversely. Placenta lacking glands. Floral tube completely persistent in fruit. A unispecific genus, with a single polymorphic species widely distributed throughout the Neotropics.

TYPE: *Apteria aphylla* (Nutt.) Barnhart ex Small (≡ *Lobelia aphylla* Nutt.).

1. Apteria aphylla (Nutt.) Barnhart ex Small, Fl. s.e. U. S. 309. 1903; *Lobelia aphylla* Nutt., Amer. J. Sci. Arts 5: 297. 1822; *Apteria setacea* Nutt., J. Acad. Nat. Sci. Philadelphia 7(1): 64 1834. *nom. illeg.* Type: United States; eastern Florida. *Ware s. n.* (holotype: BM).

Apteria hymenanthera Miq., Stirp. Surinam. Select. 216. 1850; *Apteria aphylla* var. *hymenanthera* (Miq.) Jonker, Monogr. Burm. 208. 1938 and in Pulle, Fl. Suriname 1(1): 186. 1938. Type: Surinam. *Hostmann 959* (holotype: U; isotypes: BM, DS, G, GH, K, LE, OXF, P, W).

Fig. 21. F-I

Stems filiform, 4-25 cm tall or more, simple or branched, purplish except toward base. Leaves few, purplish to white, more or less ovate, 0.5-3.5 cm long. Flowers few, widely separated, with filiform pedicels up to 20 mm long; floral tube 4-16 mm long; tepals narrowly ovate to narrowly oblong, 1.2-5.3 mm long; usually purple (rarely white) with stripes inside the throat. Stamens yellow, inserted 2-4.5 mm below the insertion of the inner tepals; style 2.4-4.5 mm long, crowned by a persistent floral tube; seeds brownish, more or less ellipsoid, mostly 0.3-0.4 mm long or sometimes longer.

General distribution: Southeastern United States, southern Mexico, Central America, Greater and Lesser Antilles, Trinidad, and South America as far as Paraguay and southern Brazil.

Distribution in Puerto Rico: In moist, deeply-shaded humus at chiefly middle elevations (300-800 m). It is probably more common than its few records seem to indicate. Recorded from Bayamón (Cerro La Peña), Manatí, Maricao, Naguabo, Río Grande, and Yabucoa.

Selected specimens examined: PUERTO RICO: Maricao: Indiera Fría, *N.L. Britton et al. 4472* (US).

2. BURMANNIA

Burmannia L., Sp. Pl. 287. 1753.

Erect autotrophic (rarely saprophytic), terrestrial (rarely epiphytic) herbs without rhizomes but with delicately filiform roots. Stems simple or branched. Leaves minute and scale-like to rather large, sometimes basal and rosulate. Inflorescence a terminal, bifurcate, open to capitate cincinnus, or else sometimes the plant with a solitary terminal flower. Flowers erect (rarely nodding), tubular to salverform, sessile to shortly pedicellate. Outer tepals entire, larger than the inner ones, all inserted at the same level; inner tepals sometimes incurved over the stamens. Floral tube cylindrical to trigonous, wingless to broadly 3-winged. Anthers 3, sessile, inserted just below the inner tepals. Style 3-branched at the apex, each branch with a bilabiate (or sometimes a funnel-shaped) stigma. Ovary 3-locular, trigonous, with axile placentation; septal nectaries 3, sometimes present, opening at base of the floral tube. Capsule crowned by the persistent perianth, this ultimately dehiscent. Seeds yellowish to greenish brown, more or less ellipsoid, 0.2-1 mm long. A pantropical genus with 60 species, of which 30 occur in Asia, 11 in Africa, and 19 in the Neotropics, extending from southeastern United States to Argentina, Paraguay, and southeastern Brazil.

LECTOTYPE: *Burmannia disticha* L., designated by Britton & A. Brown, Ill. Fl. N. U.S., ed. 2, 1: 547. 1913.

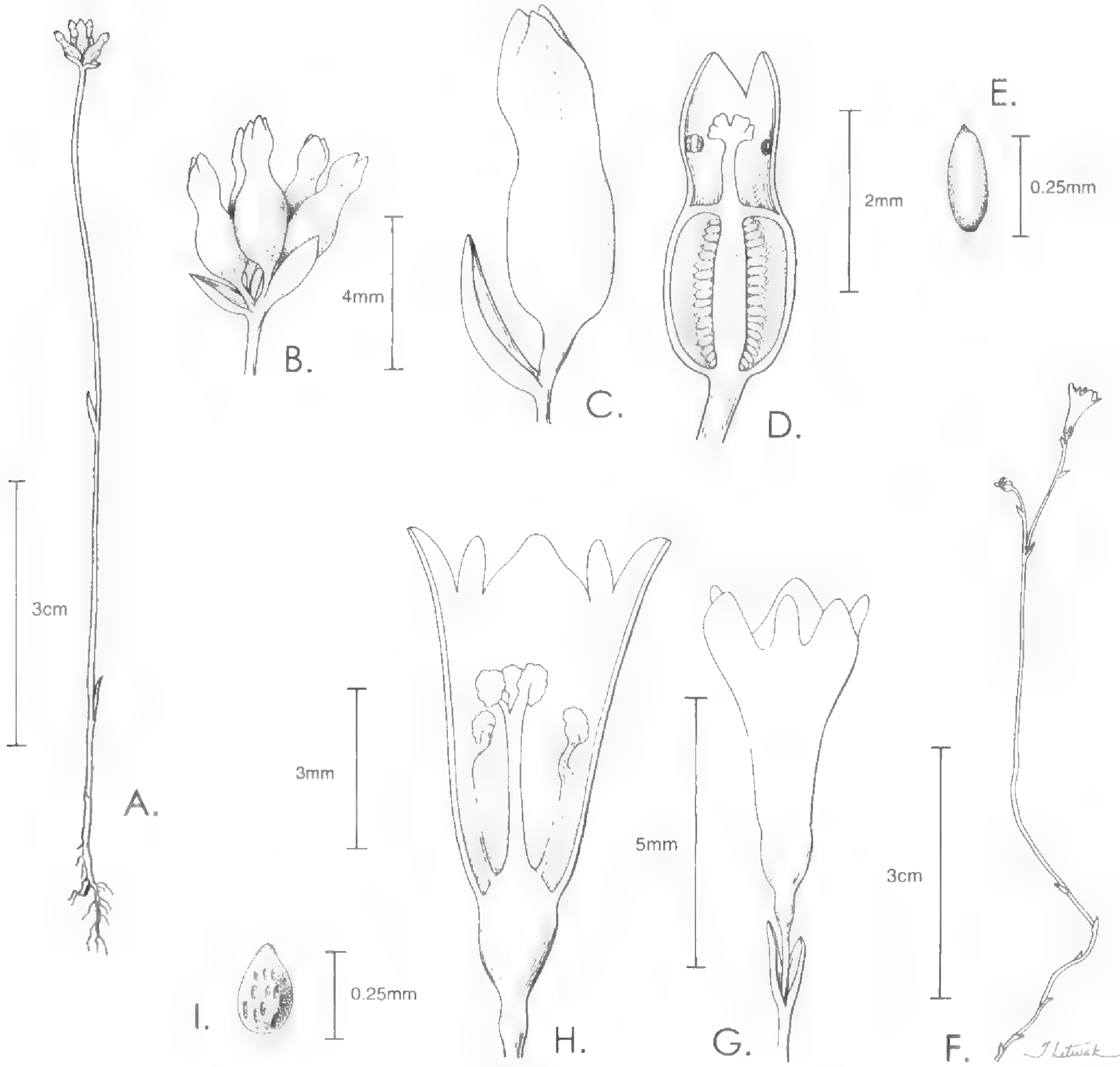


Fig. 21. A-E. *Burmannia capitata.* **A.** Habit. **B.** Inflorescence. **C.** Flower and bract. **D.** L.s. flower showing axial placentation and ovules, stamens, and style. **E.** Seed. **F-I.** *Apteria aphylla.* **F.** Habit. **G.** Flower and bracts. **H.** L.s. flower showing stamens and style. **I.** Seed. (A-E, from *Proctor 39469*; F-I, from *Proctor 42775*).

1. Burmannia capitata (J. F. Gmel.) Mart., Nov. Gen. Sp. Pl. 1: 12. 1823; *Vogelia capitata* J. F. Gmel., Syst. Nat. 2: 107. 1791; *Tripterella capitata* (J. F. Gmel.) Michx., Fl. Bor.-Amer. 1: 19. 1803. Type: United States; North Carolina. *Walter s. n.* (BM ?).

Fig. 21. A-E

Delicate, usually unbranched, erect herb mostly 4-34 cm tall (rarely more), stems yellowish to green. Leaves subulate to narrowly ovate, 1.6-9 mm long (rarely longer), up to 2 mm wide, usually few and inconspicuous, sometimes apparently lacking. Inflorescence 1- to many-flowered, usually head-like consisting of 2 densely contracted cincinni (rarely the later upright and extended). Flowers sessile or subsessile, tubular, white to yellowish white, mostly 2.5-6 mm long; outer tepals deltate; inner tepals elliptic, sometimes lacking; floral tube mostly 0.7-1.5 mm long, the wings reduced to ribs; style 1-1.8 mm long. Ovary obovoid, ellipsoid, or globose, 1.3-2.5 mm long. Capsules white to yellow, 1.3-2.9 mm long,

dehiscent by transverse slits; seeds 0.2-0.4 mm long.

General distribution: Southeastern United States, southern Mexico, Central America, Greater Antilles, Trinidad and northern South America, eastern South America south to Paraguay and southeastern Brazil.

Distribution in Puerto Rico: Grows on moist white silica sand at or near sea level, but has also been found on roadside banks at lower middle elevations (to 200 m), very rare but also easily overlooked. Recorded from Las Marias, Manatí, and Vega Baja.

Selected specimens examined: PUERTO RICO: Manatí: SE side of Laguna Tortuguero, *Strong et al. 425* (US). Vega Baja: Bo. Algarrobo, just S of Laguna Tortuguero, *Proctor & Thomas 45099* (US); *Woodbury s.n.* (US).

3. GYMNOSIPHON

Gymnosiphon Blume, Enum. Pl. Javae 1: 29. 1827.

Erect saprophytic herbs with small, cylindrical, slightly tuberous rhizomes, these densely covered with minute, narrowly ovate, imbricate scales and also bearing filiform roots. Inflorescence a terminal double cincinnus, each branch 1- to 10-flowered, the base of the inflorescence bearing two stem-clasping bracts. Flowers white, erect, salver-shaped, pedicellate; outer tepals 3-lobed; inner tepals very small, inserted in the floral tube below the insertion of the outer tepals. Stamens sessile, the connective without appendages; anther-sacs dehiscing horizontally. Stigmas mostly with long filiform appendages. Each placenta with two globose apical glands. Upper part of the floral tube quickly deciduous from the developing fruit. A pantropical genus of 24 species, of which 14 are found in the Neotropics, 7 occur in tropical Asia, and 3 in tropical Africa.

TYPE: *Gymnosiphon aphyllus* Blume.

Key to species of *Gymnosiphon*

1. Capsules broadly obovoid to ellipsoid or globose, 3-5.5 mm long including the persistent part of the floral tube; pedicels up to 5 mm long ..... 1. *G. niveus*
1. Capsules mostly very broadly obovoid, 2.5-4.2 mm long including the persistent part of the floral tube; pedicels up to 1.5 mm long ..... 2. *G. sphaerocarpus*

1. Gymnosiphon niveus (Griseb.) Urb., Symb. Antill. 3: 444. 1903; *Ptychomeria nivea* Griseb., Cat. Pl. Cub. 257. 1866. Type: Cuba. *Wright 3285* (lectotype: GOET; isotypes: BM, G, GH, MO, NY, S), designated by Maas et al., Fl. Neotrop. Monogr. 41: 126. 1986.

Gymnosiphon germaini Urb., Symb. Antill. 3: 444. 1903. Type: Guadeloupe. *Germain, s.n.* (holotype: B, destroyed; isotype: G).

Gymnosiphon portoricensis Urb., Symb. Antill. 3: 445. 1903; *Ptychomeria portoricensis* (Urb.) Schltr., Repert. Spec. Nov. Regni Veg. 17: 257. 1921. Syntypes: Puerto Rico. *Sintenis 5170* (B, G, GH, GOET, K, M, P, S, U); *Sintenis 5259; Sintenis 5707.*

Stems filiform, 4-28 cm tall, white, simple or rarely branched. Leaves few, ovate, 0.7-2 mm long. Inflorescence of 2 cincinni, 0.3-6 cm long, 1- to 9-flowered; pedicels mostly 1-4.5 mm long. Flowers white, 5-7 mm long; central lobe of outer tepals the largest, ovate, up to 1.1 mm long, the outer lobes smaller; inner tepals entire, much smaller than the outer ones. Stamens inserted below the insertion of the inner tepals. Style (including branches and stigmas) up to 2.6 mm long, the stigmas with filiform appendages. Ovary obconic, 1.2-2.1 mm long. Capsules ellipsoid, up to 3.7 mm long (including the persistent part of the floral tube, 3-5.5 mm long); seeds brownish yellow to yellowish white, irregularly and broadly ellipsoid.

General distribution: Greater and Lesser Antilles.

Distribution in Puerto Rico: Known only from the collections of *Sintenis (5170, 5259, 5707*), dating from late 19th century, not recently collected. Reported for Aguada, Coamo, and

Yabucoa.

Note: Although Jonker cited Sintenis 5170 as the type for *Gymnosiphon portoricensis* Urb. in his monograph of Burmanniaceae, he failed to lectotypify this name because he did not select a particular herbarium.

Selected specimens examined: PUERTO RICO: Yabucoa: *Sintenis 5170* (photo at US ex B).

2. Gymnosiphon sphaerocarpus Urb., Symb. Antill. 3: 442. 1903; *Ptychomeria sphaerocarpa* (Urb.) Schltr., Repert. Spec. Nov. Regni Veg. 17: 257. 1921. Syntypes: Guadeloupe. *L'Herminier s. n.* (B, G); *Duss 3942* (NY-2).

Herb 6-16 cm tall with white, branched or unbranched stems, the small rhizomes beset with narrowly ovate scales 1.7-2 mm long. Leaves oval to broadly ovate 0.8-2.1 mm long. Inflorescence bifurcate, of paired cincinni, each branch 0.5-9 cm long and with 2-10 flowers; rarely each cincinnus branched again; pedicels mostly 0.3-1.5 mm long, sometimes longer. Flowers pale yellow in bud, white at anthesis, 3.2-5 mm long with floral tube 3.2-3.5 mm long; outer tepals 3-lobed, the middle lobe larger than the others; inner tepals entire, very small. Stamens not described. Style (including branches and stigmas) 1.4-1.8 mm long; stigmas almost sessile, horseshoe-shaped, without appendages. Ovary obconic, 0.7-1.5 mm long. Capsules broadly obovoid, to 2.8 mm long. Seeds 0.2-0.3 mm long.

General distribution: Greater and Lesser Antilles.

Distribution in Puerto Rico: A tiny saprophytic plant, easily overlooked, known from a single record (*Britton et al. 4471*) from Indiera Fría, Maricao.

Selected specimens examined: PUERTO RICO: Maricao: Indiera Fría, *Britton et al. 4471* (F, NY, US).

DOUBTFUL GENUS

Cymbocarpa refracta Miers was cited by Liogier and Martorell (2000) as occurring in wet forests in the Luquillo mountains, however, no specimen have been located to confirm this report.

Family 12. **HYPOXIDACEAE** *Star Grass Family*

Hypoxidaceae R. Br. in Flinders, Voy. Terra Austr. 2: 576. 1814, *nom. conserv.*

by G. R. Proctor

Perennial herbs with tuberous rhizomes or corms. Leaves mostly radical, prominently veined, often hairy. Flowers bisexual, actinomorphic. Perianth-tube very short or absent or consolidated into a long beak on top of the ovary; segments 6, spreading, more or less uniform. Stamens 6 or 3, inserted at the bases of the segments; anthers 2-locular, opening lengthwise. Ovary inferior, 3-locular; styles 1 or 3; ovules numerous in each locule, in 2 series on axile placentas. Fruit a capsule or fleshy and indehiscent. Seeds usually small, black; embryo enclosed by copious endosperm. A family of 7 to 10 genera and ca. 150 species, mainly in the southern hemisphere.

TYPE: *Hypoxis* L.

Reference: Brackett, A. 1923. I. Revision of the American species of *Hypoxis*. Rhodora 25: 120-147.

Key to the genera

1. Ovary extended to form a long beak below the perianth; leaves plaited; fruit berry-like ..... 1. *Curculigo*
1. Ovary not beaked; leaves flat, not plaited; fruit a capsule ..... 2. *Hypoxis*

1. CURCULIGO

Curculigo Gaertn., Fruct. Sem. Pl. 1: 63. 1788.

Perennial herbs with a vertical short, cylindrical or corm-like rhizome, bearing contractile roots, the stems and leaves with bifurcate or stellate hairs. Leaves tristichous, few, plicate-veined, elongate, linear. Inflorescences solitary or umbellate, short. Flowers borne among leaves, short-pedicelled, villose; perianth 6-parted, borne on a tube-like extension of the ovary, perianth segments unequal; stamens 6, the anthers linear; ovary 3-celled, with 2 to many ovules per cell, the style short, with 3 stigmas. Fruit slightly fleshy, indehiscent; seeds subglobose, black. A tropical genus of ten species.

TYPE: *Curculigo orchioides* Gaertn.

Key to the species *Curculigo*

1. Flowers numerous, capitate; leaves elliptic-lanceolate, to 1.8 m long, 6-10 cm wide ... 1. *C. capitulata*
1. Flowers 1-4, each on a solitary peduncle; leaves linear, to 30 cm long, 1.5 cm wide ..... 2. *C. scorzonerifolia*

1. Curculigo capitulata (Lour.) Kuntze, Revis. Gen. Pl. 2: 703. 1891; *Leucojum capitulatum* Lour., Fl. Cochinch. 1: 199. 1790. Type: "Cochinchina". *Loureiro, s.n.* (probably at BM).

Curculigo recurvata Dryand. in W. T. Aiton, Hort. Kew. ed. 2, 2: 253. 1811. Type: Unknown, a plant brought into cultivation at Kew in 1805, originally collected from Bangladesh by W. Roxburgh.

Fig. 61. A

Plants acaulescent, commonly forming dense clumps; rhizome fleshy, erect, cylindrical. Leaves forming a rosette, with a pseudopetiole 30-60 cm long; blades elliptic-lanceolate, narrowed at both ends, 30-90 × 5-15 cm, abaxially pubescent, otherwise glabrous. Inflorescence capitate, erect, becoming curved or recurved in fruit; peduncles short to elongate, pubescent; bracts narrowly lanceolate; flowers with yellow perianth, 2-2.5 cm long. Fruit fleshy, globose or ellipsoid, whitish turning black with age.

General distribution: Native to India, Sri Lanka, S. China, Malaysia and tropical Africa, now widespread in tropical regions through cultivation, sometimes adventive.

Distribution in Puerto Rico: Commonly cultivated in Puerto Rico. Reported as adventive in Arecibo and San Juan.

Selected specimens examined: PUERTO RICO: Photo: *Acevedo-Rdgz. s.n.*

2. Curculigo scorzonerifolia (Lam.) Baker, J. Linn. Soc., Bot. 17: 124. 1878; *Hypoxis scorzonerifolia* Lam., Encycl. 3: 183. 1789. Lectotype: West Indies. Plumier, *Descr. Pl. Amér. t. 108, f. 2. 1693*, designated by R.A. Howard, Fl. Lesser Antill. 3: 462. 1979.

Fig. 22. A-H

Underground stem fleshy, erect, cylindrical. Leaves few, linear; blades 10-30 × 0.5-1.5 cm, pilose, gradually or abruptly narrowed at the base. Flowers borne singly on short axillary peduncles; perianth tube 2 cm long, pilose, the lobes bright yellow inside, 1.1-1.2 cm long.

General distribution: Tropical America.

Distribution in Puerto Rico: Cultivated and adventive in San Juan and Mayagüez.

Common name: Puerto Rico: *Gorgojo.*

Selected specimens examined: PUERTO RICO: Mayagüez: Cerro Las Mesas, *Proctor & McKenzie 43778* (US).

2. HYPOXIS

Hypoxis L., Syst. Nat. ed. 10, 972, 986, 1366. 1759.

Herbs with corms. Leaves linear, grass-like. Scapes slender, 1- to few-flowered; perianth 6-parted,

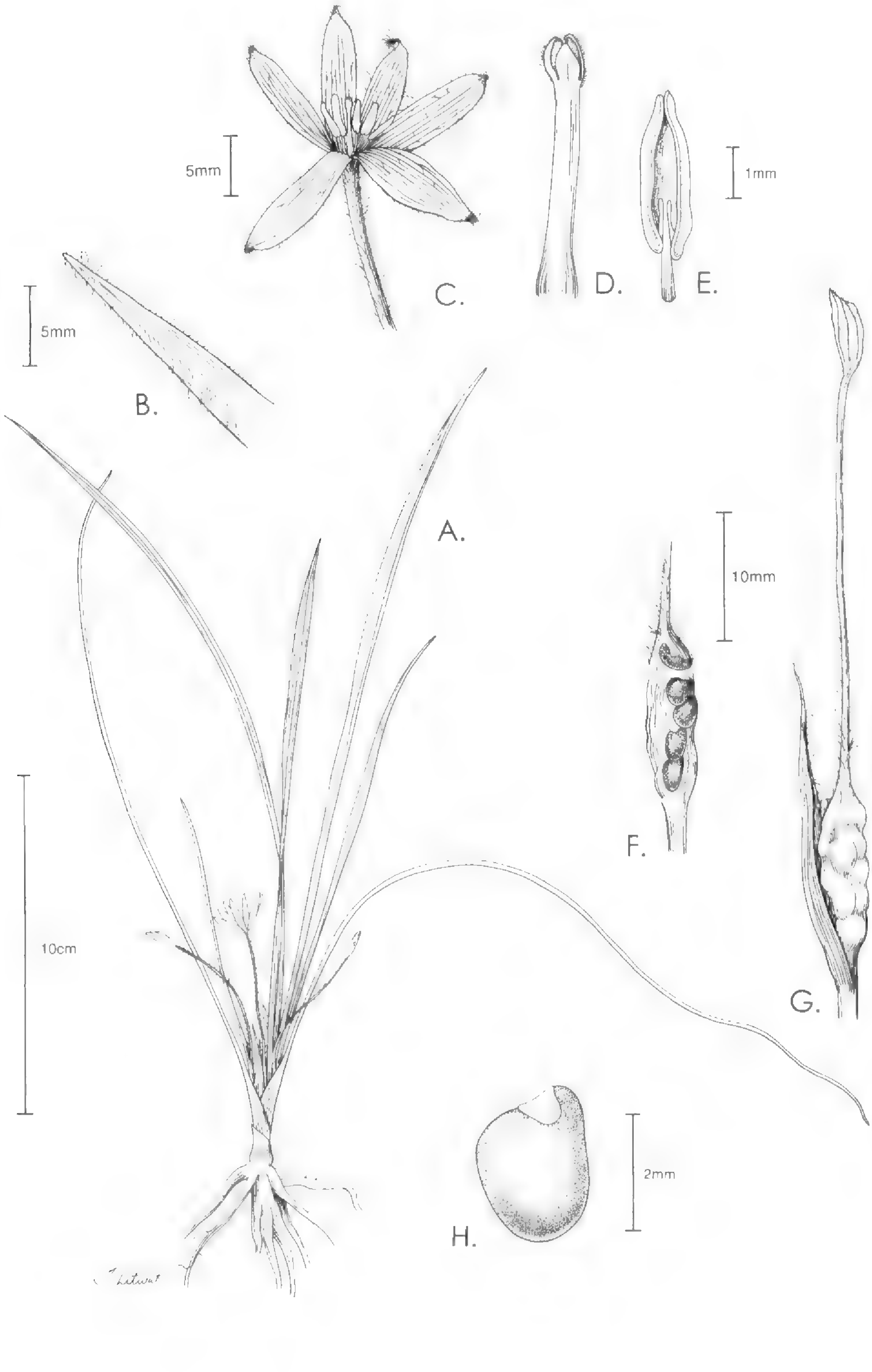


Fig. 22. A-H. *Curculigo scorzonerifolia.* **A.** Habit. **B.** Apex of leaf blade. **C.** Flower. **D.** Style and stigmata. **E.** Stamen. **F.** Fruit showing seeds. **G.** Fruit. **H.** Seed. (from *Proctor 43778*).

the segments free, withering and persistent; stamens inserted on perianth, the filaments short, the anthers erect; ovary 3-celled, not extended or narrowed at apex, with numerous ovules, the style short, the stigmas 3. Capsule thin-walled, elongate, circumcissile below the apex; seeds subglobose, tuberculate, black. A genus of about 100 species, occurring in the Americas, Africa, and Eastern Asia, through the Malay Peninsula to Australia.

LECTOTYPE: *Hypoxis hirsuta* (L.) Coville, (≡ Ornitogalum hirsutum L.), designated by Britton & A. Brown, Ill. Fl. N. U.S. ed. 2, 1: 534. 1913.

Key to species of *Hypoxis*

1. Peduncles 2- or more-flowered; leaves more than 2 mm broad..... 1. *H. decumbens*
1. Peduncles 1-flowered; leaves mostly less than 2 mm broad ..... 2. *H. wrightii*

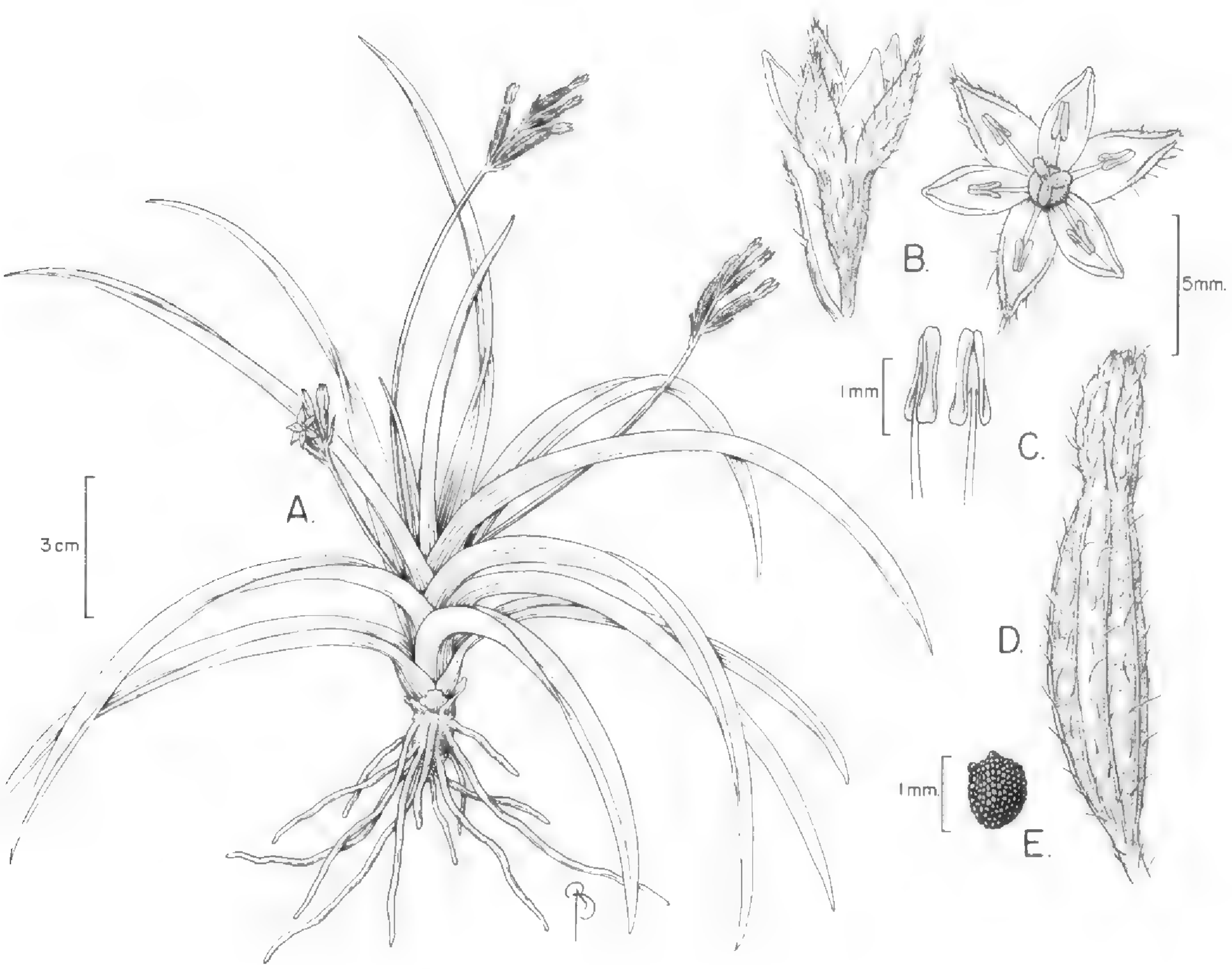


Fig. 23. A-E. *Hypoxis decumbens*. **A.** Habit. **B.** Flower, lateral and top views. **C.** Stamen, lateral and frontal views. **D.** Capsule. **E.** Seed. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

1. Hypoxis decumbens L., Syst. Nat. ed. 10, 986. 1759. Lectotype: Jamaica. *Browne s.n.* (LINN 427.2), designated by R.A. Howard, J. Arnold Arbor. 60: 300. 1979.

Fig. 23. A-E

Plants 10-30 cm tall; underground stems upright, cylindrical, 1-2 cm thick. Leaves linear, 10-45 × 0.3-1 cm, flattened, sparsely pilose to glabrous. Inflorescence slender, ascending or recurving, 4-20 cm long, pilose near apex, 1- to 4-flowered. Perianth 9-14 mm long, greenish, pilose, the inner perianth segments yellow, 4-9 mm long. Capsule cylindrical, ellipsoid or club-shaped, 7-12 mm long, tipped with the persistent, withered perianth. Seeds 0.8-1.2 mm in diam., black.

General distribution: Mexico, Central America, Greater Antilles, Lesser Antilles, and South America.

Distribution in Puerto Rico and the Virgin Islands: Occasional in moist grounds at middle and high elevations (300-1200 m). Reported from Adjuntas, Aibonito, Arecibo, Bayamón, Dorado, Florida, Hatillo, Jayuya, Luquillo, Manatí, Maricao, Mayagüez, Naguabo, Orocovis, Río Grande, San Juan, San Sebastián, Villalba, Yabucoa, and Yauco; St. John, Tortola, and Virgin Gorda.

Common name: Puerto Rico: *Coquí.*

Selected specimens examined: Puerto Rico: Adjuntas: *Liogier 9981* (US). Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10561* (US). Hatillo: Bo. Bayaney, *Proctor et al. 41878* (US). Luquillo: Caribbean National Forest, El Yunque Area, *Acevedo-Rdgz. & Siaca 6227* (US). Manatí: SE side of Laguna Tortuguero, *Strong et al. 421* (US). Maricao: *Sintenis 488* (US). Mayagüez: Cerro Las Mesas, *N.L. Britton & Hess 2698* (US). Naguabo: Loma La Mina, *Shafer 3239* (US). Río Grande: Luquillo Mountains, *Acevedo-Rdgz. & Siaca 6227* (NY, UPRRP, US). San Juan: Río Piedras, *Stevenson 44* (US). San Sebastián: *Sargent 409* (US). St. John: Bethania to Rosenberg, *N.L. Britton & Shafer 279* (US). Bordeaux Mt., *Woodbury 69a/6556* (VINPS). Tortola. Road Town to High Bush, *N.L. Britton & Shafer 779* (US). Virgin Gorda: Wet places on mountains, *Fishlock 113* (US).

2. Hypoxis wrightii (Baker) Brackett, Rhodora 25: 140. 1923; *Hypoxis juncea* var. *wrightii* Baker, J. Linn. Soc., Bot. 17: 106. 1878. Type: Cuba. *Wright 239* (isotype: GOET).

Underground, tuberous stem cylindrical or ovoid, 5-15 mm long, up to 12 mm thick, covered with the fibrous remains of old leaf sheaths. Leaves 5-18 (-25) cm × 1.5-2 (-3) mm, thinly cottony-hairy. Peduncles 3-5 cm long in flower, longer in fruit, very slender. Perianth ca. 8 mm across, light yellow, the outer members hispid externally, the inner hispid in midline only; ovary pubescent. Capsule densely pilose, ellipsoid-obovate, 4-6 mm long. Seeds oblong, minutely muriculate, 1 mm long, glossy, black.

General distribution: Southern United States and the Greater Antilles.

Distribution in Puerto Rico: Uncommon, reported for Cataño, Manatí, Dorado, and Vega Baja.

Selected specimens studied: Puerto Rico: Cataño, *Sintenis 1067* (US). Manatí / Vega Baja, *Underwood & Griggs 956* (US).

Family 13. **IRIDACEAE** *Iris Family*

Iridaceae Juss., Gen. Pl. 57. 1789, *nom. conserv.*

by G. R. Proctor

Chiefly perennial herbs from rhizomes, bulbs or corms. Leaves equitant, entire. Inflorescences axillary, scapose, racemose, or cymose; flowers bisexual, regular or irregular, solitary or in clusters arising from spathe-like bracts; perianth of 6 segments usually fused at the base, short-lived and fugacious or persistent; stamens 3, inserted on the perianth opposite the outer ones, the filaments separate or partially united; ovary inferior, 3-locular, with numerous ovules; styles distinct, entire or divided, sometimes flattened and petal-like. Fruit a loculicidally 3-valved capsule; seeds spherical, flattened, or angled. A

cosmopolitan family of 60 genera and ca. 800 species widely distributed throughout the world in both temperate and tropical regions.

TYPE: *Iris* L.

Key to the genera

1. Perianth actinomorphic or nearly so 2
   2. Robust plants with stout rhizomes and aerial stems to 1 m tall or more; perianth orange with purple spots, 3-5 cm wide ..... 1. *Belamcanda*
   2. Diminutive tufted plants less than 15 cm tall; flowers pale yellowish, not over 5 mm wide..... 5. *Sisyrinchium*
1. Perianth more or less zygomorphic 3
   3. Stem a rhizome; flowers produced on a flattened, leaf like scape; perianth showy, the outer segments white ..... 4. *Neomarica*
   3. Stem a subterranean bulb or corm 4
      4. Perianth-segments united at base to form a tube 5
         5. Spathes emarginate; perianth tube straight or nearly so; perianth lobes bright orange-red ..... 2. *Crocosmia*
         5. Spathes lanceolate, acute; perianth-tube curved; Perianth lobes light pink to pale orange ..... *[Gladiolus]*
      4. Perianth-segments free or nearly so 6
         6. Style-branches undivided, subulate; perianth white; capsules enclosed by a spathe-like bract ..... 3. *Eleutherine*
         6. Style-branches divided; perianth yellow; capsules exserted on long pedicels ..... 6. *Trimezia*

1. BELAMCANDA

Belamcanda Adans., Fam. Pl. 2: 60, 524. 1763, *nom. conserv.*

Perennial caulescent herbs with short, stout rhizomes and alternate equitant leaves. Flowers in branched, terminal, bracteate clusters; perianth tube short, the segments equal, with mottled colors; stamens 3, the filaments free but adnate to base of alternate perianth segments; ovary 4-locular, the style slender, with flattened and emarginate branches. Capsules obovoid, loculicidally 3-valved, the valves becoming recurved and deciduous; central column persistent, bearing temporarily attached, globose, shiny black seeds. An eastern Asiatic genus of two species, one of them widely cultivated and often becoming naturalized in tropical countries.

TYPE: *Belamcanda chinensis* (L.) A. De Candolle

1. Belamcanda chinensis (L.) DC. in Redouté, Liliac. 3: t. 121. 1805; *Ixia chinensis* L., Sp. Pl. 36. 1753; *Belamcanda punctata* Moench., Methodus 529. 1794, *nom. illeg.* Lectotype: "India". (LINN 58. 34), designated by R.A. Howard, Fl. Lesser Antill. 3: 513. 1979.

Stems stout, erect, up to 1 m tall. Leaves 2-ranked, with overlapping bases, lengthwise folded, ascending, linear-lanceolate, 15-50 cm long. Inflorescences to 50 cm long, with bracts similar to leaves. Flowers several in each cluster; perianth 3-5 cm long, the segments nearly alike, oblong, obtuse at apex, narrowed at base, bright orange-yellow mottled with crimson or purple spots. Capsules 2-2.6 cm long, dehiscent; seeds globose, black.

General distribution: Native of tropical Asia, now widely distributed in warm countries as an escape from cultivation.

Distribution in Puerto Rico: Uncommon in open, disturbed places between 200-800 m. Recorded from Adjuntas, Bayamón, Juncos, and Yabucoa.

Common name: Puerto Rico: *Maravilla.*

Selected specimens examined: PUERTO RICO:

Adjuntas: Garzas, *Sintenis 4761* (US). Bayamón: *Stevenson 3045* (US); *Underwood & Griggs 853* (US). Juncos: Sierra de Juncos, *Sintenis 1882* (US).

2. CROCOSMIA

Crocosmia Planch., Fl. Serres Jard. Eur. 7: 161. 1851-52.

Erect, perennial, corm-producing herbs that spread vegetatively by means of stolons. Leaves narrowly ensiform. Inflorescence a loosely-branched panicle bearing showy orange to scarlet flowers; outer bracts acute or obtuse and apiculate at the apex, 4-9 mm long, spreading. Capsules subglobose, as broad as or broader than long, 3-grooved or 3-lobed; seeds 1 or 2 in each locule. An African genus of 6 species, often cultivated for their showy flowers. A single species of hybrid origin has become established in several mountainous areas of the West Indies.

TYPE: *Crocosmia aurea* (Pappe ex Hook.) Planch. (≡ Tritonia aurea Pappe ex Hook.)

1. Crocosmia × crocosmiiflora (Lemoine ex E. Morren) N. E. Br., Trans. Roy. Soc. South Africa 20: 264. 1932; *Montbretia* × *crocosmiiflora* Lemoine ex E. Morren [as "*crocosmiaeflora*"], Belgique Hort. 31: 299. 1881; *Tritonia crocosmiiflora* (Lemoine ex E. Morren) Nicholson [as "*crocosmiflora*"], Dict. Gard. 4: 94. 1886. Lectotype: A garden hybrid. Lemoine ex E. Morren, *Belgique Hort. 31: t. 14. 1881*, here designated.

Fig. 61. C

Corms depressed-globose, ca. 2.5 cm in diam., clothed with a loose fibrous covering; stems up to 1 m tall; leaves as long as the stems, mostly 0.8-2 cm wide, glabrous. Flowers sessile, spicate and distichous on the slightly zigzag panicle-branches, each solitary within a small 2-bracted spathe; spathe bracts 6-7 mm long, acuminate-aristate; perianth bright orange-scarlet, the tube slender, straight or slightly curved and spreading, the limb 6-parted, the lobes ca. 2 cm long. Capsules 3-4 mm in diam.

General distribution: This garden hybrid between *Crocosmia aurea* Planch. and *C. pottsii* (Baker) N. E. Br. has been cultivated nearly worldwide in warm countries outdoors, and indoors in colder areas, and has escaped and become naturalized in many places, including mountainous parts of the West Indies.

Distribution in Puerto Rico: Adventive in the Cordillera Central between 700-1100 m. Recorded from Adjuntas, Aibonito, Cayey, Ciales, Jayuya, Ponce, and Villalba.

Selected specimens examined: PUERTO RICO: Jayuya: Toro Negro Forest Reserve, *Acevedo-Rdgz. & Angell 9424* (NY, UPR, UPRRP, US).

3. ELEUTHERINE

Eleutherine Herb., Edward's Bot. Reg. 29: t. 57. 1843, *nom. conserv.*

Acaulescent herbs arising from tunicate bulbs. Leaves few, narrowly ensiform, long-acuminate at apex, strongly plicate or plaited. Inflorescences on long slender scapes terminated by leaf-like spathes and several, unequally-stalked, often recurved, bracteate flower-clusters. Flowers without perianth-tube, the segments separate and subequal, spreading. Stamens attached to base of the segments, with short free filaments. Ovary oblong, containing numerous ovules; style short, with 3 apically stigmatic branches. Capsules loculicidally 3-valved; seeds many, small, angulate. A Neotropical genus of 2 species of wide distribution.

TYPE: *Marica plicata* Ker-Gawl., nom. illeg. (*Moraea plicata* Sw., nom. illeg., *Sisyrinchium latifolium* Sw.).

Reference: Goldblatt, P. & N. Snow. 1991. Systematics and chromosome cytology of *Eleutherine* Herbert (Iridaceae). Ann. Missouri Bot. Gard. 78: 942-949.

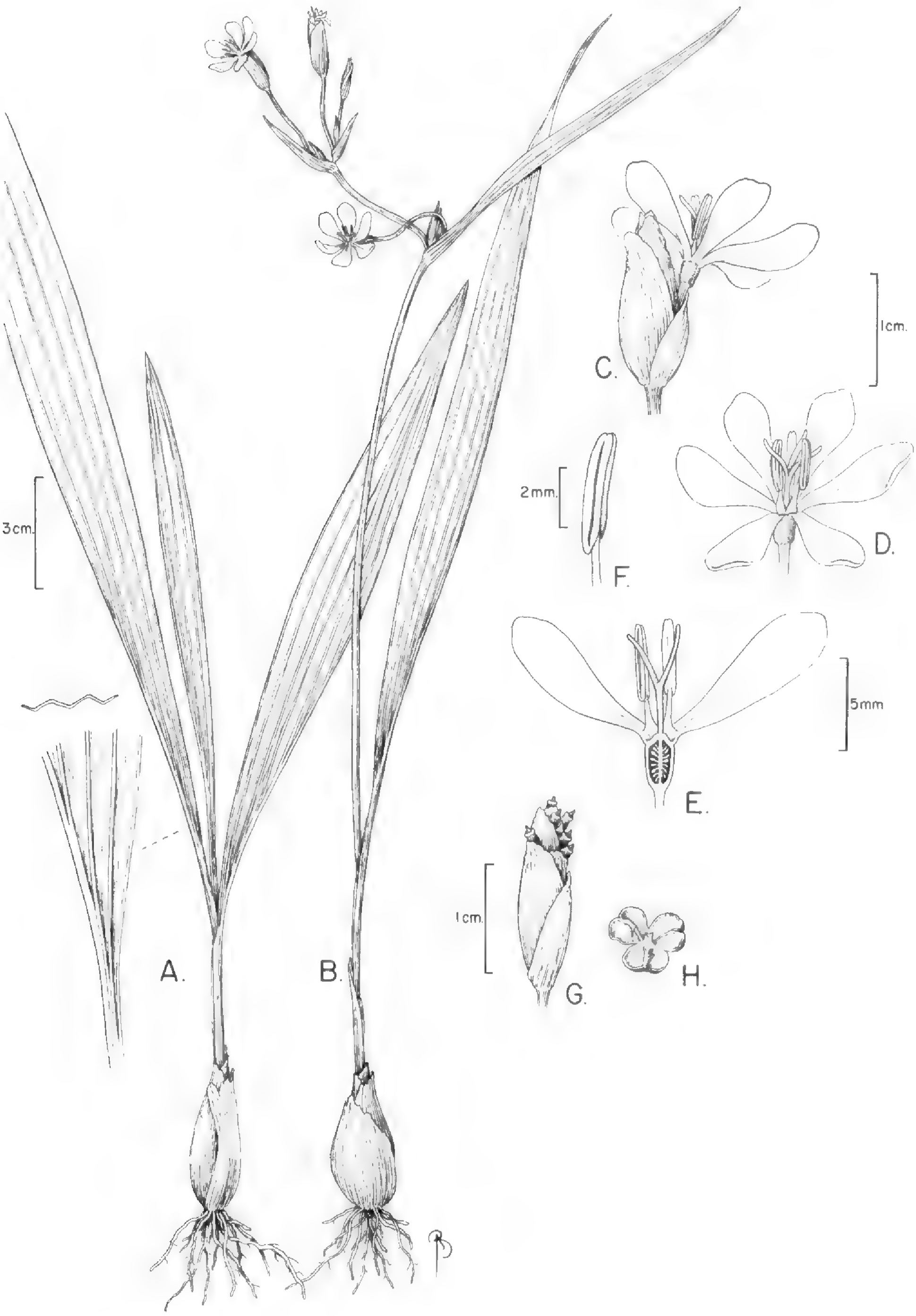


Fig. 24. A-H. *Eleutherine bulbosa.* **A.** Bulb and leaves with detail of leaf base and transverse section of blade. **B.** Plant with inflorescence. **C.** Lateral view of part of inflorescence with an open flower. **D.** Lateral view of flower. **E.** L.s. of flower. **F.** Anther and apex of filament. **G.** Part of infructescence. **H.** Open fruit without seed. From Mori, S. et al. 1997. Vascular plants of central French Guiana. Mem. NYBG Vol. 76(1).

1. Eleutherine bulbosa (Mill.) Urb., Repert. Spec. Nov. Regni Veg. 15: 305. 1918; *Sisyrinchium bulbosum* Mill., Gard. Dict. ed. 8, *Sisyrinchium* no. 3. 1768; *Galatea bulbosa* (Mill.) Britton, Brooklyn Bot. Gard. Mem. 1: 37. 1918. Neotype: Guadeloupe. *Stehlé 2520* (US-1955627), here designated.

Sisyrinchium latifolium Sw., Prodr. 17. 1788; *Moraea plicata* Sw., Fl. Ind. Occid. 1: 92. 1797, nom. illeg.; *Eleutherine plicata* Bold., Fl. Dutch W. Ind. Is. 59. 1909, nom. illeg.; *Cipura plicata* Griseb., Fl. Brit. W. I. 589. 1864, *nom. illeg.* Type: West Indies. Plumier (Burman ed.), *Pl. Amer., t. 46, fig. 2. 1756.*

Eleutherine anomala Herb., Edward's Bot. Reg. 29: t. 57. 1843. Type: *Bot. Reg. 29: t. 57.* 1843.

Fig. 24. A-H

Bulb ovoid, 3 cm or more in diam., the tunica reddish brown. Leaves 1 or 2, linear-lanceolate, 14-70 × 0.5-3.5 cm, long- and sharply-acuminate at apex. Scapes to 67 cm long; spathes oblong, 1.5 cm long; branched clusters of flowers with slender pedicels; perianth white, 2-2.5 cm broad, the spreading segments obovate. Capsules globose, ca. 1 cm in diam.; seeds black.

General distribution: Greater and Lesser Antilles, and northern and western South America (especially Peru) to southeastern Brazil, but mostly absent from Amazonia.

Distribution in Puerto Rico and the Virgin Islands: Introduced as an ornamental. Recorded from Cayey and Juana Díaz; cultivated in St. Croix and collected on St. Thomas in 1881, cited by Britton & P. Wilson (1924) for St. John apparently from a cultivated plant.

Common names: Puerto Rico: *Lágrimas de la Virgen, Mariposa, Ninfa.*

Note: Miller in his original description of this species mentioned that it grew naturally in the West Indies, but did not cite any original element, therefore a neotype is here designated.

Selected specimens examined: PUERTO RICO: Juana Díaz: Sabana Llana, *Stevenson 2307* (US). ST. THOMAS: *Eggers s.n.* (US).

4. NEOMARICA

Neomarica Sprague, Bull. Misc. Inform. Kew 1928: 280. 1928.

Perennial herbs with short-creeping rhizomes. Leaves elongate, leathery, ensiform, glabrous. Scapes erect or slanted, broadly winged (appearing leaf-like), terminating in a single elongate spathe-like leaf, producing from the axil 1 to few pedunculate bracteate flowers. Flowers large, actinomorphic; with 3 spreading outer segments and 3 smaller inner ones, all with distinctive colors and markings according to species; inner segments bearing nectaries near the folded base; filaments free, enlarged at base, thread-like above; anthers connivent around the style below the stigmatic branches; style-branches crested at apex with stigmatic lobes below the crests. Capsules obovoid or cylindrical, truncate. Seeds angular and brownish, or else globose, fleshy, and reddish. A Neotropical genus of about 15 species.

TYPE: *Neomarica northiana* (Schneev.) Sprague (≡ *Moraea northiana* Schneev.).

1. Neomarica northiana (Schneev.) Sprague, Bull. Misc. Inform. Kew 1928: 280. 1928; *Moraea northiana* Schneev., Icon. Pl. Rar. t. 41, 42. 1793. Lectotype: Peru. Schneev., *Icon. Pl. Rar. t. 41. 1793*, here designated.

Plants up to 1.2 m tall or more. Leaves often 1 m long and up to 6 cm wide. Outer flower segments white, shading to yellow and mottled with deep red towards base; inner segments barred with light blue near tips. Fruits green.

General distribution: Native of Peru; widely cultivated elsewhere.

Distribution in Puerto Rico: Widely cultivated, reported by Liogier & Martorell (1982) to be naturalized in forests at Jajome, Cayey.

Cultivated Species

Neomarica caerulea (Ker Gawl.) Sprague is also sometimes cultivated, but is not recorded as being naturalized in Puerto Rico. It is easily distinguished from *N. northiana* by its flowers with deep purple-blue outer segments. This species is native to Brazil, and it is naturalized in Jamaica.

5. SISYRINCHIUM

Sisyrinchium L., Sp. Pl. 964. 1753.

Perennial or sometimes annual, usually tufted, grass-like, scapose herbs mostly of small stature with fibrous roots and small or obsolete rhizomes. Leaves basal, with linear blades. Scapes 2-edged or 2-winged, when branched, each node bearing a bract resembling a leaf blade. Flowers in terminal clusters arising from within spathes of usually 2 bracts. Perianth blue, white, or yellow, with 6 spreading lobes. Stamens 3, with filaments united nearly to the apex, the anthers clustered. Ovary 3-locular, the style-branches 3, filiform, alternating with the anthers or else the style scarcely divided; ovules few to many in each locule. Capsules more or less globose, sometimes depressed or sometimes longer than thick, sometimes angled, opening at the apex. Seeds smooth or pitted. A chiefly North American genus of more than 75 species.

TYPE: *Sisyrinchium bermudiana* L.

1. Sisyrinchium rosulatum E.P. Bicknell, Bull. Torrey Bot. Club 26: 228. 1899. Syntypes: United States; South Carolina. *L. R. Gibbs s. n.* (NY); United States; Alabama. *C. Mohr s. n.* (MO).

Sisyrinchium exile E. P. Bicknell, Bull. Torrey Bot. Club 28: 573. 1901. Type: United States; Texas. *J. E. Bodin s. n.* (MIN, US).

Small annual herb with fibrous roots only. Leaves erect, often densely tufted, mostly 2-8 cm long (rarely longer), 1-2 mm wide, with entire margins. Scapes erect, up to 11 cm long or more, very slender, the body 0.2-0.5 mm thick, the wings 0.2-0.3 mm wide. Spathes narrowly foliaceous, with unequal bracts, the outer one longer and slightly falcate. Flowers urceolate, whitish or yellowish, sometimes with purple lines and a purple eye-ring; pedicels capillary, flexuous, up to 1 cm long or more. Capsules globose or nearly so, light brownish with purple stripes on the sutures, 2.5-3 mm in diam.; seeds many, very small (0.5-0.7 mm thick), asymmetrically angled.

General distribution: Southeastern United States, Hispaniola, and Puerto Rico.

Distribution in Puerto Rico: Confined to higher parts of the Cordillera Central at elevations of 950-1250 m. Recorded from Jayuya, Ponce, and Villalba.

Note: The closely related *S. micranthum* Cav. occurs widely in Mexico, Central and South America, and has been attributed to Hispaniola. If these two annual species are combined, the correct name would appear to be *S. micranthum*.

Selected specimens examined: PUERTO RICO: Jayuya: Cerro Maravillas, *Liogier et al. 28916* (UPR). Ponce: Monte Jayuya, *Axelrod & Chavez 4279* (US).

6. TRIMEZIA

Trimezia Salisb. ex Herb., Edward's Bot. Reg. 30 misc. 88. 1844.

Perennial cormous herbs, the tunica splitting and shredding into coarse fibers. Leaves flat, more or less linear, equitant, with prominent mid rib. Flowers stalked, actinomorphic, with more than one produced from each spathe; perianth tube lacking, the segments in two dissimilar whorls of 3, the outer ones obovate with broad claw, the inner ones smaller and more or less deflexed. Stamens short, erect, the filaments free; ovary clavate, the style basally subulate, 3-branched above, the branches ending in small tubercles overtopping the small stigmas. Capsules oblong, exserted beyond the bracts. A small Neotropical genus of 5 species occurring from Mexico to tropical South America and also in the West Indies.

TYPE: *Trimezia meridensis* Herb.

1. Trimezia steyermarkii R. C. Foster, Rhodora 64: 310. 1962. Type: Guatemala. *Steyermark 49539* (holotype: GH; isotype: F).

Trimezia martinicensis sensu Liogier & Martorell, Fl. Puerto Rico and Adjacent Is. 1982, non (Jacquin) Herbert, 1844.

Fig. 61. B

Corms ovoid, 2-4 cm in diam., with brown tunica fibers. Leaves rather thin-textured, 30-70 × 2-4 cm, with a prominent mid rib. Scapes equaling or slightly overtopping the leaves, the inflorescence terminal, several-flowered; spathe-bracts unequal, the outer 2 cm long, the inner one to 3 cm long or more. Pedicels glabrous, more or less equaling the spathes at anthesis. Ovary glabrous, clavate, less than 1 cm long. Flowers yellow with mottled brownish purple bands toward base, ca. 3 cm wide when fully expanded. Capsules and seeds not observed.

General distribution: Mexico and Central America, cultivated elsewhere and sometimes naturalized.

Distribution in Puerto Rico: Frequently cultivated as an ornamental. Recorded as naturalized in Arecibo, Patillas, and Río Grande.

Note: This species resembles *T. martinicensis*, with which it has sometimes been confused. *T. steyermarkii* however is much larger than *T. martinicensis*. The latter species, common in the Lesser Antilles and Jamaica, is strangely absent from other parts of the Greater Antilles, but occurs widely in South America.

Selected specimens examined: PUERTO RICO: Arecibo: Río Abajo State Forest, vicinity of Campamento Radley, *Proctor 43015* (US). Río Grande: El Yunque Forest Reserve, *Acevedo-Rdgz. & Angell 9455* (UPR, UPRRP, US).

CULTIVATED GENERA

Gladiolus cuspidatus Jacq. (Jayuya: Cordillera Central, Bo. Saliente, *Proctor et al. 43969*, US) and *G. x gandavensis* Van Houtte (Orocovis: Doña Juana, Toro Negro, *Liogier & Martorell 350811*, UPR and Ponce: La Carmelita, *Liogier et al. 34392*, UPR), both natives of South Africa, are planted as ornamentals in Puerto Rico. *Gladiolus communis* L., native to Europe, was cited by Martorell et al. (1981) as cultivated in Puerto Rico.

Tigridia pavonia (L. f.) DC., native to Mexico, was cited by Martorell et al. (1981) as cultivated in Puerto Rico.

Family 14. **AMARYLLIDACEAE** *Amaryllis Family*

Amaryllidaceae J. St. Hil., Expos. Fam. Nat. 1: 134. 1805, *nom. conserv.*

by G. R. Proctor, P. Acevedo-Rodríguez, & M. T. Strong

Perennial herbs with usually bulbous or rarely rhizomatous stocks. Leaves few, basal, entire, usually rather soft. Flower bisexual, actinomorphic or subregular, often showy, solitary or umbellate and subtended by spathaceous bracts at the top of a naked simple scape. Perianth petaloid of 6 segments in 2 similar series often united below into a tube. Stamens 6, opposite the perianth-segments, hypogynous or epipetalous; filaments free or joined together, often curved upwards in laterally directed flowers; anthers 2-locular, basi- or medifixed, opening lengthwise or rarely by terminal pores. Ovary superior or more usually inferior, usually 3-locular with axile placentas; style slender; ovules mostly numerous, anatropous. Fruit a capsule or fleshy berry. Seeds with fleshy endosperm and small embryo. A family of about 90 genera and some 1100 species

TYPE: *Amaryllis* L.

Key to the genera

1. Flower solitary ..... 5. *Zephyranthes*
1. Flowers in umbels, not solitary 2
2. Flowers with a staminal cup, always white 3
3. Filaments short or apparently absent ..... 2. *Eucharis*
3. Filaments very long, up to ca. 6 cm ..... 4. *Hymenocallis*
2. Flowers without a staminal cup, perianth white or variously colored 4
4. Perianth orange, bearing a corona ..... 3. *Hippeastrum*
4. Perianth white, rose, crimson, or striped of similar colors, without a corona ..... 1. *Crinum*

1. CRINUM

Crinum L., Sp. Pl. 291. 1753.

Plants bearing subterranean bulbs with short to long sheathing necks. Leaves succulent, linear or strap-shaped, somewhat broadened toward apex, spreading or arching, the margins entire or toothed. Inflorescence an umbellate cluster of few to many flowers subtended at base by 2 large, broad, spathe-like bracts, the scape solid, erect, green or brightly colored. Flowers large, showy, short-pedicellate; perianth white, rose, crimson or striped of similar colors, funnel-shaped or trumpet-shaped, with a long, cylindrical, straight or curved tube subtended by narrow bracts at base, the lobes linear, lanceolate, or oblong, subequal; stamens spreading or declinate, the filaments long, filiform, inserted in the throat of the perianth tube, the anthers linear versatile; ovary globose to oblong with 2 to several ovules in each locule, the style long, filiform, the stigma minute, capitate. Fruit a subglobose, tardily dehiscent capsule; seeds large, bulbiform, fleshy, green, with very thick endosperm. A genus of approximately 130 species, widely distributed in tropical, subtropical and warm-temperature regions worldwide.

LECTOTYPE: *Crinum americanum* L., designated by Britton & P. Wilson, Bot. Porto Rico 5: 160. 1923.

Key to species of *Crinum*

1. Leaf margins minutely denticulate. 2
2. Perianth lobes pure white ..... [*C. americanum*]
2. Perianth white with a pink or reddish median stripe ..... 2. *C. zeylanicum*
1. Leaf margins smooth. 3
3. Perianth lobes rose, adaxially with a darker central stripe; filaments of stamens purple ..... 1. *C. asiaticum*
3. Perianth lobes red or rose throughout; filaments of stamens red ..... [*C. erubescens*]

1. Crinum asiaticum L., Sp. Pl. 292. 1753. Lectotype: Malabar or Ceylon. *Hermann, Hort. Lugd.-Bat. Cat. 683, 1687*, designated by Verdoorn in Killick (ed.), Fl. Pl. Africa 47 : pl. 1875. 1983.

Crinum amabile Donn ex Ker-Gawl., Bot. Mag. 39: fig. 1605 A & B. 1814. Lectotype: East Indies. *Bot. Mag. 39: fig. 1605A*. 1814, here designated.*

Crinum amabile Donn, Hort. Cantab. ed. 6, 83. 1811, *nom. nud.*

Bulb with a rather massive, stem-like neck, rising 30 cm or more above ground. Leaves numerous, spreading, narrowly lanceolate, 70-100 × 9-15 cm, clasping at the slightly narrowed base and gradually tapering to the apex, the margins entire. Scape 40-80 cm tall, 2-keeled. Spathe-valves deltate, reddish, 12-18 cm long. Umbel of 18-30 pedicellate flowers; perianth with slender, cylindrical, deep rose or red tube, 7-12 cm long; lobes ca. 2 cm broad, equaling or exceeding the tube, pink outside and whitish with deep pink median stripe within; stamens and stigmas purple. Fruit not seen.

General distribution: Native to India, but commonly cultivated in tropical and subtropical regions, and in greenhouses in temperate areas.

Distribution in Puerto Rico: Commonly cultivated in Puerto Rico and the Virgin Islands. Persisting after cultivation on Mona Island, vicinity of the light house.

Note: * R.A. Howard lectotypified this name with Bot. Mag. 39: fig. 1605, wich includes figures A & B. Although his lectotypification does not represent a problem for the interpretation of this name, the present writers want to further restrict its typification to plate 1605A as it is a more representative illustration.

Selected specimens examined: PUERTO RICO: Mona Island, *Proctor 43131* (US-2).

2. Crinum zeylanicum (L.) L., Syst. Nat. ed. 12, 2: 236. 1767; *Amaryllis zeylanica* L., Sp. Pl. 293. 1753; *Crinum latifolium* var. *zeylanicum* (L.) Hook. f. in Trimen, Handb. Fl. Ceylon 4: 272. 1898. Lectotype: J. Commelijn, *Horti med. amstelod. 1: tab. 73.* 1697, designated by Dassanayake, Taxon 30: 481. 1981.

Figs. 25. A, B; 61. H

Perennial, acaulescent herb, with a bulbous base; bulb ovoid to subglobose, 9-13 × 5-11 cm, with a short neck; roots stout, coarse, 3-5 mm wide. Leaves many; blades 80-125 × 2.8-5.5 cm, strap-shaped, reflexed, finely veined, acuminate at apex, the margins with remote, blunt teeth. Scape 25-50 cm long, glabrous, reddish tinged; spathe-like bracts deltate, membranaceous, 6-7 × 2-3 cm. Flowers 5-10, subsessile or short-pedicellate; perianth segments oblong-lanceolate, 8-12 × 2-3 cm, white with a pink or reddish median stripe, the tube curved at maturity 8-13 cm × 3-4 mm; anthers 1-2 cm long, greenish, the filament 6.5-8 cm long, whitish or pink; style 15-20 cm long. Fruit not seen.

General distribution: Native to Sri Lanka and India, widely cultivated in tropical areas and in greenhouses in temperate regions.

Distribution in Puerto Rico and the Virgin Islands: Apparently naturalized in Cabo Rojo, Mona Island, San Juan, and Utuado; St. Croix, St. John and St. Thomas.

Common name: Puerto Rico: *Lirio.*

Selected specimens examined: PUERTO RICO: Cabo Rojo: Bo. Boquerón, *Proctor 44947* (US). Mona Island, *Acevedo-Rdgz. & Siaca 4376* (NY, SJ, US). San Juan: Bo. Puerta de Tierra, *Proctor 43989* (US). Utuado: *N.L. Britton & Cowell 1236* (US). ST. CROIX: Bassin Yard, *Ricksecker 494* (US). ST. JOHN: Coral Bay Quarter, Road to Ajax Peak, *Acevedo-Rdgz. et al. 5112* (NY, UPRRP, US). ST. THOMAS: *Eggers s.n.* (US).

Cultivated Species

Crinum americanum L. and *C. erubescens* Aiton are commonly cultivated, but the species are not known to become naturalized. *Crinum giganteum* Andr., from Africa, was recorded by Eggers as cultivated in the Virgin Islands according to Britton & P. Wilson (1924).

2. EUCHARIS

Eucharis Planch. & Linden in Linden, Cat. Pl. Exot. 8: 3. 1853, *nom. conserv.*

Bulbs tunicate. Leaves several, the blades broad, abruptly narrowed into slender petioles. Inflorescence scapose, bracteate below the umbellate flowers. Flowers pedicellate; perianth tube cylindrical, somewhat curved dilated above, the segments equal, spreading, ovate or oblong; stamens inserted at the throat, the filaments appendaged below the middle, the anthers versatile; ovary globose, 3-celled, with many superposed ovules in each cell, the style filiform, the stigma capitate, 3-lobed. Capsule lobed, dehiscent; seeds large. A tropical South American genus of 19 species.

TYPE: *Eucharis candida* Planch. & Linden.

References: Meerow, A. W. 1989. Systematics of the Amazon lilies, *Eucharis* and *Caliphruria* (Amaryllidaceae). Ann. Missouri Bot. Gard. 76: 137-220. Meerow, A. L. & B. Dehgan. 1984. Re-establishment and lectotypification of *Eucharis amazonica* Linden ex Planch. (Amaryllidaceae). Taxon 33: 416-422.

1. Eucharis amazonica Linden ex Planch., Fl. Serres Jard. Eur. 12: 1216. 1857. Lectotype: Peru. Planch., *Fl. Serres Jard. Eur. 12: fig. 103. 1857*, designated by Meerow & Dehgan, Taxon 33: 421. 1984.

Eucharis grandiflora sensu authors, non Planchon & Linden, 1853.

Fig. 61. D

Bulbs globose, to 7 cm in diam. Leaves with petioles 15-30 cm long; blades oblong to elliptic or oval, 25-35 × 10-15 cm, the base cuneate or rounded, the apex abruptly short-acuminate. Scape to 50 cm tall. Inflorescence umbellate, with 4-6 hanging flowers. Pedicels 1-2.5 cm long; perianth tube 5 cm long, the segments oblong-ovate, 3-5 cm long, white with apiculate apex; filament flanges connate, free portion lanceolate. Capsule 2.5 cm in diam.

General distribution: Native of Peru, found in cultivation in many tropical countries.

Distribution in Puerto Rico: Naturalized or persistent in forest understory. Reported from Adjuntas and Arecibo.

Common names: Puerto Rico: *Anunciación, Lirio turco.*

Selected specimens examined: PUERTO RICO: Adjuntas: Monte Guilarte State Forest, *Proctor 48711* (US). Arecibo: Río Abajo Forest Reserve, *Acevedo-Rdgz. 9394* (UPR, US).

3. HIPPEASTRUM

Hippeastrum Herb., Bot. Reg. 7 (App.): 31. 1821, *nom. conserv.*

Herbs with tunicate bulbs. Leaves basal, linear or strap-shaped. Inflorescence umbellate on stout hollow scape; spathe bracts lanceolate, membranaceous. Flowers few or several, stalked, declinate; perianth tube short or long, with scales or corona in throat, the segments spreading, nearly equal; stamens 6, inserted at the throat, the filaments filiform, the anthers linear, versatile; ovary 3-celled, with many, superposed ovules in each cell, the style long, declinate, the stigma capitate or trifid. Capsule globose, loculicidally dehiscent; seeds flattened, black. An American genus with 40-60 species indigenous to South America, two of which are widely cultivated.

TYPE: *Hippeastrum reginae* (L.)Herb. (≡ *Amaryllis reginae* L.), *typ. conserv.*

1. Hippeastrum puniceum (Lam.) Kuntze, Revis. Gen. Pl. 2: 703. 1891; *Amaryllis punicea* Lam., Encycl. 1: 122. 1783; *Amaryllis equestris* Aiton, Hort. Kew. 1: 417. 1789, *nom. illeg. Hippeastrum equestre* Herb., Bot. Reg. 7 (App.): 31. 1821, *nom. illeg.* Lectotype: Surinam. Merian, *Metamorph. Insect. Surinam. t. 22. 1705*, designated by R.A. Howard, Fl. Lesser Antill. 3: 476. 1979.

Bulbose herb; bulbs globose or globose-ovoid, 4-5 cm long; plants commonly stoloniferous. Leaves strap-shaped or oblong-lanceolate, 28-65 × 3-5 cm, narrowed to a blunt apex. Scape 40-60 cm long, terete, glaucous; spathe bracts lanceolate, to 7 cm long. Inflorescence a 2- to 4-flowered umbel. Flowers declinate; pedicels 3.5-7 cm long; perianth tube to 3.5 cm long, green; tepals to 9 cm long, spreading, elliptic-obovate or obovate, bright red, red-orange and with a greenish base. Capsule rare, to 2 cm in diam.

General distribution: Apparently native to northern South America, cultivated and naturalized in southern United States (Louisiana), Central America and throughout the West Indies.

Distribution in Puerto Rico and the Virgin Islands: Reported for Arecibo, Bayamón, Cabo Rojo, Fajardo, San Juan, and Yauco; St. Croix, St. John, St. Thomas, and Tortola.

Common names: Puerto Rico: *Amapola, Lirio rojo.*

Selected specimens examined: PUERTO RICO: Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10555* (US). Bayamón: *Underwood & Griggs 852* (US). Cabo Rojo: *Sintenis 778* (US-2). Fajardo: *Sintenis 1281* (US-2). San Juan: Río Piedras, *Heller & Heller 966* (US). Yauco: *Sargent 512* (US). ST. CROIX: Bassin, *Ricksecker 286* (US). Bassin Yard, *Ricksecker 393* (US). ST. THOMAS: *Eggers 1325* (US).

4. HYMENOCALLIS

Hymenocallis Salisb., Trans. Hort. Soc. London 1: 338. 1812.

Tunicate, bulbous plants. Leaves sessile or petioled, linear or lanceolate. Scape solid, angled or flattened and ridged. Inflorescence umbellate, subtended by spathe-like, lanceolate, membranaceous bracts. Flowers sessile or slightly stalked or becoming so in fruit, each flower with 2 narrow, membranaceous bracts; perianth united below into a long, cylindrical tube, the 6 lobes spreading or recurved, linear, white; stamens 6, the filaments free above, united below into a long, cylindrical, flaring or undulate cup, often with processes between the filaments, the anthers linear, versatile; ovary 3-celled, with 2 or more ovules in each locule, the style filiform, long-exserted, the stigma capitate. Capsule fleshy; seeds 1 or 2 per locule, large, green and fleshy. An American genus of about 50 species found in warm climates.

LECTOTYPE: *Hymenocallis littoralis* (Jacq.) Salisb. (≡ *Pancratium littorale* Jacq.), designated by Britton & A. Brown, Ill. Fl. N. U.S. ed. 2, 1: 533. 1913.

References: Sealy, J. R. 1954. Review of the genus *Hymenocallis*. Kew Bull. 1954: 201-240. Smith, G. L. & M. A. Garland. 2003. Nomenclature of *Hymenocallis* taxa (Amaryllidaceae) in Southeastern United States. Taxon 52: 805-817.

Key to the species of *Hymenocallis*

1. Leaves elliptic, clearly petiolate ..... 3. *H. speciosa*
1. Leaves oblong, linear, or oblanceolate, long-tapering at base. 2
   2. Floral tube 4-6.5 cm long; tepals 8-12 cm long ..... 1. *H. caribaea*
   2. Floral tube 8-15 cm long; tepals 9-14.5 cm long. 3
      3. Leaves 4-8.5 cm wide ..... 2. *H. latifolia*
      3. Leaves 2-2.5 cm wide ..... [*H. praticola*]

1. Hymenocallis caribaea (L.) Herb., Bot. Reg. 7 (App.): 44. 1821; *Pancratium caribaeum* L., Sp. Pl. 291. 1753. Lectotype: Jamaica. J. Commelijn, *Horti med. amstelod. 2: t. 87. 1701*, designated by R.A. Howard, J. Arnold Arbor. 60: 295. 1979.

Pancratium declinatum Jacq., Select. Stirp. Amer. Hist. 99. 1763; *Hymenocallis declinata* (Jacq.) Sweet, Hort. Brit. ed. 2, 513. 1830. Type: Type unknown, from Martinique and Cayenne.

Fig. 25. C, D

Herb of sandy coastal areas. Leaves many, green, oblanceolate, 30-60 × 5-7.5 cm, tapered to an acute or acuminate apex, slightly narrowed at the base. Scape 30-60 cm long; bracts ovate to lanceolate, 3-6 cm long. Flowers 8-10 or more, fragrant; perianth tube 4-6.5 cm long, tepals 9-11 cm long, white; staminal cup funnel-shaped, margins erect 2-3 cm high, the filaments 3-5 cm long. Fruit globose, 1.5-2 cm in diam., lobed.

General distribution: Jamaica, Virgin Islands, and the Lesser Antilles.

Distribution in the Virgin Islands: St. Croix and St. John (fide Sealy, 1954) .

Common names: Virgin Islands: *Lady bug, White lily, Spider Lily.*

Selected specimens examined: ST. JOHN: Maho Bay Quarter; trail to Brown Bay, *Acevedo-Rdgz. et al. 1873* (VINPS, NY, UPR).

2. Hymenocallis latifolia (Mill.) M. Roem., Fam. Nat. Syn. Monogr. 4: 168. 1847; *Pancratium latifolium* Mill., Gard. Dict. ed. 8, no. 8. 1768. Type: Jamaica. *Sloane IV-112 [as 115]* (BM-589968).

Hymenocallis expansa (Sims) Herb., Bot. Reg. 7 (App.): 44. 1821; *Pancratium expansum* Sims, Bot. Mag. t. 1941. 1819. Type: Country unknown. *Bot. Mag. t. 1941.* 1819.

Figs. 25. C-D; 61. F

A large vigorous plant with numerous evergreen leaves. Leaves broad oblong-ensiform or narrowly and obliquely oblong-elliptic or



Fig. 25. A-B. *Crinum zeylanicum.* **A.** Habit and inflorescence. **B.** Upper portion of stamen showing anther. **C-D.** *Hymenocallis latifolia.* **C.** Upper portion of scape with open flowers. **D.** Infructescence. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

oblong-oblanceolate, tapering to the acute apex and more gradually tapered to the lowest quarter which is distinctly narrower, strongly channeled and thick, 40-77 cm long, 3.8-7.5 cm wide in upper part, 2.8-3 cm wide in lowermost quarter. Scape 40-60 (-80) cm high; flowers 10-20, sessile. Perigone: tube 8-10.6 cm long; segments 9-14.5 cm long. Staminal cup narrowly funnel-shaped with erect margins, (2.5)2.7-3.5 cm high, somewhat tube-like in lower third then widened upwards, 2.4 cm wide at the mouth, somewhat fluted and with a large usually bifid tooth between the filaments; 4.5-6 cm long. Ovary with 2, rarely 3, ovules per carpel.

General distribution: Naturally occurring in the southeastern United States, Cuba, Jamaica, Caiman Islands, Hispaniola, Puerto Rico, and Martinique.

Distribution in Puerto Rico and the Virgin Islands: Reported for Cayo Lobos, Cayo Ramos, Coamo, Fajardo, Guayama, Juana Díaz, Naguabo, Mona Island, San Juan, San Lorenzo, San Sebastián, and Vieques; St. Croix, St. John, St. Thomas, and Virgin Gorda.

Common names: Puerto Rico: *Lirio blanco, Lirio de playa; Lirio;* Virgin Islands: *Spider Lily.*

Selected specimens examined: PUERTO RICO: Coamo: Coamo Springs, *N.L. Britton & Cowell 1341* (US). Guayama: From Guayama to Aguirre, *Underwood & Griggs 387* (US). San Juan: Santurce, *Heller 257* (US-2). Vieques: Isabel Segunda to Santa Maria, *Shafer 2588* (US-2). ST. CROIX: Bassin, *Ricksecker 460* (US). ST. JOHN: Coral Bay Quarter, along dirt road to Bordeaux Mountain, *Acevedo-Rdgz. et al. 5130* (NY, US). ST. THOMAS: Elizabeth, along road 334, *Acevedo-Rdgz. 11359* (US-2). VIRGIN GORDA: Gorda Peak National Park, *Acevedo-Rdgz. & Clubbe 10892* (US).

3. Hymenocallis speciosa (L.f. ex Salisb.) Salisb., Trans. Hort. Soc. London 1: 340. 1812; *Pancratium speciosum* L.f. ex Salisb., Trans. Linn. Soc. London 2: 73, t. 12. 1794. Type: Country unknown. *Trans. Linn. Soc. London 2: t. 12.* 1794.

Leaves evergreen, several, rosulate, the 7-9 new leaves of the current year well-developed at flowering time, arising in the middle of the leaves of the previous season, distinctly petiolate, very variable in size, 38-60(95.5) cm long; blades broadly elliptic or broadly oblong-elliptic, shortly acute, cuneate at base, 26-46 cm long and 8-13.3 cm wide but 57-65.5 cm long and 10.5-15.5 cm wide in some cultivated plants; petioles broad, 9-17 cm long. Scape 30-40 cm long, glaucous, ancipitous; flowers 7-12, widely spreading, pedicellate; pedicels to 1 cm long. Perigone tube (6.5)7-9 cm long; segments (9)9.5-11.5 cm long, sometimes 12.5-15 cm in larger cultivated plants. Staminal cup funnel-shaped (2.2)2.5-3.5 cm long (4-5 cm in larger cultivated plants), toothed between the filaments; filaments almost erect, 3-4.5 (-5) cm long. Ovary with 2 ovules in each locule.

General distribution: Native to the West Indies.

Distribution in Puerto Rico and the Virgin Islands: Known only in cultivation in San Juan; and from a sterile specimen from St. John (*N. L. Britton & Shafer 1207,* US).

Cultivated Species

There is a collection (*Proctor 44848* US) from San Juan that seems to be referable to *Hymenocallis praticola* Britton & P. Wilson except for its wide floral tube. Also, Britton & P. Wilson (1924) list *H. undulata* Herb., from Venezuela, as observed in St. Thomas.

5. ZEPHYRANTHES

Zephyranthes Herb., Bot. Reg. 7 (App.): 36. 1821, *nom. conserv.*

Herbs with tunicate bulbs. Leaves few to several, linear, flat or channeled, glabrous, appearing with the flowers or after them. Scape 1-flowered, spathe-like bracts 2, variously united. Flowers with pedicel longer or shorter than the spathe; perianth funnelform, erect or ascending, white, pink, red or yellow, the 6 lobes subequal; stamens 6, equal or nearly so, the filaments glabrous, adnate to the perianth tube, the anthers versatile; ovary glabrous, 3-celled with numerous ovules in 2 rows in each locule, the style

filiform, 3-parted or 3-lobed. Capsule 3-celled, loculicidally 3-valved; seeds black, flattened. A genus of 35 to 40 species, distributed in warm climates of the New World.

TYPE: *Zephyranthes atamasco* (L.) Herb. (≡ *Amaryllis atamasco* L.*), typ. conserv.*

Key to the species of *Zephyranthes*

1. Perianth yellow ..... 1. *Z. citrina*
1. Perianth white, pink, or red. 2
2. Perianth white ..... 4. *Z. puertoricensis*
2. Perianth pink or red. 3
3. Perianth 6.3-9 cm long ..... 2. *Z. grandiflora*
3. Perianth 2.5-4 (-5.5) cm long. 4
4. Pedicels (2-) 2.5-4.5 cm long ..... 5. *Z. rosea*
4. Pedicels 0.4-0.8 cm long ..... 3. *Z. proctorii*

1. Zephyranthes citrina Baker, Bot. Mag. 108: t. 6605. 1882. Type: Guyana; Demerara. Baker, *Bot. Mag. 108: t. 6605.* 1882.

Zephyranthes eggersiana Urb., Symb. Antill. 5: 292. 1907. Syntypes: Cuba. *van Hermann 803* (B?); Haiti. *Eggers 2834* (NY!).

Amaryllis aurea Ruiz & Pav., Fl. Peruv. 3: 56. 1802, *nom. illeg.,* non. L'Heritier, 1789; *Zephyranthes aurea* Baker, Handb. Amaryll. 37. 1888, *nom. illeg.* Type: Peru. Ruiz & Pavón, *Fl. Peruv. t. 286a. 1802.*

Bulb 2.5 cm in diam., the neck narrow, elongate. Leaves 4 or 5, narrowly linear, 15-32 cm × 2-3 mm, channeled, apex obtuse. Scape 10-25 cm long, spathe bracts 2 cm long. Flowers erect, with pedicels 2-4 cm long, exceeding the bracts in fruit; perianth 3-4 cm long, yellow except for short greenish tube; style shorter than the stamens, the stigma capitate, 3-lobed. Capsule depressed, 1 cm in diam.

General distribution: Southern United States (Florida and Mississippi), Mexico, Central America, Cuba, Hispaniola, Grand Cayman, Jamaica, Puerto Rico, and northern South America.

Distribution in Puerto Rico: Recorded from San Juan and Vega Alta.

Common name: Puerto Rico: *Duende amarillo.*

Selected specimens examined: PUERTO RICO: San Juan: *Proctor 44849* (SJ). Vega Alta: *Proctor 46463* (SJ).

2. Zephyranthes grandiflora Lindl., Bot. Reg. 11: t. 902. 1825. Type: Mexico. Lindley, *Bot. Reg. 11: t. 902.* 1825.

Zephyranthes carinata Herb., Bot. Mag. 52: t. 2594. 1825; *Atamosco carinata* (Herb.) P. Wilson in Britton & P. Wilson, Bot. Porto Rico 5: 159. 1924. Type: Mexico. Herbert, *Bot. Mag. 52: t. 2594.* 1825.

Bulb ovoid, 2-3 cm in diam., the neck short. Leaves present at anthesis, 4-6, linear, 15-40 (-55) cm × 4-9 mm, subacute at apex, bright green, reddish tinged proximally. Scape slender, 10-33 (-50) cm long, hollow; spathe bracts 3-5 cm long, 2-5 mm wide. Flower pedicels 2-3.5 cm long; perianth erect, funnel-shaped, 6.3-9 cm long, bright rose-red or rose, the tube 1.3-2 cm long, the perianth segments obovate, 5-7.5 × 1.3-2 cm wide; stamens included, half the length of the perianth; anthers linear; style filiform, clavate distally, the stigma 3-lobed, the lobes recurved. Capsule short-pedicelled, broadly rounded or 3-lobed, broadly rounded; seeds semi-ovate, compressed, black, shiny.

General distribution: Mexico, Central America, Greater Antilles, and northern South America.

Distribution in Puerto Rico and the Virgin Islands: Ciales and Mayagüez; St. Croix.

Common names: Puerto Rico: *Adelfa, Duende rosado.*

Selected specimens examined: PUERTO RICO: Ciales: Toro Negro Forest Reserve, Rt. 143, between Rts 149 & 564, *Axelrod & Wells 2200* (UPRRP).



Fig. 26. A-D. *Zephyranthes proctorii.* **A**. Habit. **B**. Flower, lateral view. **C.** Flower, l.s. showing stamens and gynoecium. **D.** Dehisced fruit.(A, D, from *Proctor 43387;* B,C, from *C.M. Taylor 7019*).

3. Zephyranthes proctorii Acev.-Rodr. & M. T. Strong, sp. nov. Type: Puerto Rico; Guayanilla: Guánica State Forest, 0.6 km WNW of Punta Vaquero, pond area, 19 Apr 1987, *Proctor 43387* (holotype: US; isotypes: NY, SJ!).

Fig. 26. A-D

A Zephyranthes rosea Lindley pedicellis brevissimis differt.

Bulb small, 2-2.5 cm in diam., the neck 1-2 cm long, 5 mm wide. Leaves 3-6, linear-filiform, 6-20 cm × 1-1.5 mm, flat, obtuse at apex, bright green from base to apex. Scape slender, 6-18 cm × 1-2.3 mm, spathe bracts 1.6-2.3 cm long. Flowers erect, with short pedicel 4-8 mm long; perianth funnel-shaped, 3-4 × 2-3.5 cm, bright deep pink or pinkish purple with yellow throat, greenish at base, the tube 5-8 mm long, the perianth segments ovate to oval, abruptly narrowed medially to a slender limb, the expanded distal portion 7-10 mm wide; stamens included; anther linear-filiform, elongate, 7-8 mm long; style filiform, about equaling the stamens, the stigma 3-lobed, the lobes slightly reflexed. Capsule broadly 3-lobed; seeds small, ca. 4 × 2 mm, semi-ovate, compressed, black, shiny.

General distribution: Endemic to Puerto Rico.

Distribution in Puerto Rico: In dry forest scrub and thickets on limestone. Recorded from Guánica, Guayanilla and Yauco. The new species is morphologically similar to *Z. rosea* from which it differs by the much shorter pedicels.

Additional *specimens examined*: PUERTO RICO: Guánica: Reserva Forestal Guánica, *Ackerman & Montalvo 1506* (UPRRP). Yauco: Guánica Reserve, near the end of the road, *Taylor & Ross 7019* (UPRRP).

4. Zephyranthes puertoricensis Traub, Pl. Life 7: 37. 1951. Type: Puerto Rico. *Traub 151* (holotype: MO!).

Amaryllis tubispatha sensu Ker Gawl., Bot. Mag. 38: t. 1586. 1813, non L'Héritier, 1789.

Atamosco tubispatha sensu Britton & P. Wilson, Bot. Porto Rico 5: 158. 1923, non (L'Her.) M. Gómez, 1914.

Bulb subglobose, 2-2.5 cm in diam., the neck stout. Leaves 3, linear, 12-17 cm × 5-6 mm, apex obtuse. Scape 11-18 cm long; spathe bracts 2-3 cm long, strongly bifid at apex. Flowers ascending; perianth white, tinged with green at base, the tube 2-4 mm long; tepals 4-5 cm long; stamens shorter than the perianth; style deeply trifid. Capsule 11 mm in diam.

General distribution: Southern United States (Florida), Panama (?), Jamaica, Puerto Rico, Virgin Islands, and the Lesser Antilles.

Distribution in Puerto Rico and the Virgin Islands: Described from a plant cultivated in Maryland (United States) from bulbs collected in "northwestern" Puerto Rico. Recorded from Fajardo and San Juan; Guana Island and St. Thomas.

Common name: Puerto Rico: *Duende blanco.*

Selected specimens examined: PUERTO RICO: Fajardo: *Sintenis 1300* (US). San Juan: Bo. Puerta de Tierra, *Proctor & Rivera 47875* (US). ST. THOMAS: *Eggers s.n.* (US).

5. Zephyranthes rosea Lindl., Bot. Reg. 10: t. 821. 1824; *Atamosco rosea* (Lindl.) Greene, Pittonia 3: 188. 1897. Type: Cuba. *Bot. Reg. 10: t. 821.* 1824.

Bulb small, 1.5-2.5 cm in diam., the neck short, slender. Leaves 3-6, linear, 10-25 (-30) cm × 2-6 mm, flat, obtuse at apex, bright green from base to apex. Scape slender, 10-30 cm × 1.3-3 mm, spathe bracts 1.5-2.5 cm long. Flowers erect, with pedicel (2-) 2.5-4.5 cm long; perianth broadly funnel-shaped, 2.5-4 (-5.5) × 2.5-3.5 cm, rose-red, greenish at base, the tube short 2-3 mm long, the perianth segments oval to slightly obovate, (2-) 2.5-4 × 0.9-1.5 cm; stamens included; anthers linear; style filiform, the stigma 3-lobed, the lobes slightly reflexed. Capsule rounded or broadly 3-lobed; seeds small, semi-ovate, compressed, black, shiny.

General distribution: Southern United States (Florida), Central America, Cuba, Bahamas, Hispaniola, Puerto Rico, Virgin Islands, and the Lesser Antilles.

Distribution in Puerto Rico and the Virgin Islands: Collected in Bayamón, Guayanilla, Manatí, San Juan, and Vega Alta; St. Croix.

Common name: Puerto Rico: *Duende rojo.*

Selected specimens examined: PUERTO RICO: Manatí: Bo. Tierras Nuevas Saliente, *Axelrod et al. 10965* (UPRRP). San Juan: Santurce, field, *Guzman 76* (UPRRP). ST. CROIX: Bassin, *Ricksecker 1* (US).

CULTIVATED GENERA

Amaryllis belladonna L., from South Africa, was cited by Britton & P. Wilson (1924) as planted for ornament in Virgin Islands gardens.

Cyrtanthus uniflorus Ker Gawl., from South Africa, was recorded by Krebs as formerly grown in St. Thomas (Britton & P. Wilson, 1924).

Molineria hortensis Britton, collected and described by Britton (1924) from a plant cultivated in a garden near La Muda, Caguas, Puerto Rico, origin unknown. The type is: *Britton 7892* (holotype: NY).

Narcissus tazetta L., native to Europe, was cited by Martorell et al. (1981) as cultivated in Puerto Rico.

Sprekelia formosissima (L.) Herb., of Mexican origin, was cited by Britton & P. Wilson (1924) as occasionally grown for ornament in Virgin Islands gardens.

Family 15. **AGAVACEAE** *Century Plant Family*

Agavaceae Dumort., Anal. Fam. Pl. 57. 1829, *nom. conserv.*

by G. R. Proctor & P. Acevedo-Rodríguez

Chiefly large, more or less succulent, leathery or fibrous rosette herbs to very large rosette shrubs or trees with stout woody trunks often with secondary tissue growth. Roots fibrous and sometimes rhizomatous; plants sometimes proliferating by means of stolons. Leaves spirally arranged and with margins entire, spiny, or toothed, usually broadest near the base and gradually tapered to a sharp apex, the vascular bundles in the leaves are accompanied by thick, strong fibers, thus making possible the use of various species as textile plants. Inflorescence stalks (scapes) stout, terminal, clothed with few or many more or less appressed bracts; inflorescence large, paniculate with more or less cymose branches; in many species the plant is monocarpic, producing a giant inflorescence and then dying. Flowers usually bisexual, trimerous, hypogynous or epigenous, actinomorphic or slightly zygomorphic, and usually rising from the axils of well-developed bracts; tepals (segments) most often white or yellow, and are free or more or less fused into a tubular or campanulate perianth, sometimes abruptly widened and urceolate in the outer part. Stamens 6, inserted at or near the base of the perianth, the filaments sometimes short and relatively stout (*Yucca*) or else filiform and long-exserted (*Agave*); anthers introrse, often peltate, opening longitudinally; pollen with reticulate exine, the grains dispersed singly or in tetrads. Ovary 3-locular, each cavity with several to many ovules; style short to rather long, with punctiform to trilobate stigma. Fruit a dry or berry-like capsule containing several to many seeds; seeds often flattened or compressed. An entirely New World family of about 8 genera and more than 300 species. Many species have been introduced into all the warmer parts of the world, either for ornament or for commercial production of textiles, and some of these have become naturalized in various countries.

The circumscription used for this family follows that of Dahlgren et al. (1985), as substantiated by Bogler & Simpson (1996). The broader concepts of R.A. Howard (1979, Flora of the Lesser Antilles) and Lott & García-Mendoza (1996, Flora Mesoamericana) are not supported by the recent DNA sequence studies of Bogler & Simpson (1996).

TYPE: *Agave* L.

References: Bogler, D. J. & Simpson, B. B. 1996. Phylogeny of Agavaceae based on its rDNA sequence variation. Amer. J. Bot. 83: 1225-1235. Dahlgren, R. M. T., H. T. Clifford & P. F. Yeo. 1985. The Families of the Monocotyledons, pp. 157-161, Springer-Verlag, Berlin, Heidelberg, New York, Tokyo.

Key to the genera

1. Flowers erect on cymose or umbellate inflorescence branches; perianth yellow or greenish yellow; stamens exserted ..... 1. *Agave*
1. Flowers more or less pendulous, on racemose inflorescence branches or in panicles; perianth white or greenish white; stamens included. 2
2. Plants acaulescent with a large rosette of elongate leaves with toothed or spiny margins ..... 2. *Furcraea*
2. Plants shrubby with branched woody stems each ending in a tight spiral rosette of entire dark green spine-tipped leaves ..... 3. *Yucca*

1. AGAVE

Agave L., Sp. Pl. 323. 1753.

Robust perennial (usually monocarpic) rosette plants, usually acaulescent but sometimes producing a short sub-woody trunk; roots hard, fibrous. Leaves large, succulent, fibrous, spine-tipped, the margins sparsely to densely armed with hard, sharp prickles (rarely smooth and entire). Inflorescence paniculate (rarely racemose or spike-like, these not Antillean), often up to 6 m tall or more, with a stout main stalk (scape) clothed with more or less appressed spine-tipped bracts; branches usually many, horizontal or ascending. Flowers in cymose or umbellate clusters, these often dense; perianth tubules toward the base, the segments imbricate in bud. Stamens 6, the filaments long-exserted, the anthers attached at the middle. Ovary inferior, 3-locular, the many ovules in 2 rows in each locule; style elongate with 3-lobed stigma. Fruit a dry, many-seeded, loculicidally dehiscent capsule; seeds flattened, black (or white if abortive). A widely distributed genus of more than 200 species (300 according to some authors), found from southern United States, Mexico and Central America, the West Indies (including the Bahamas, Greater Antilles, Cayman Islands, and Lesser Antilles), and South America to Peru and Argentina.

LECTOTYPE: *Agave americana* L., designated by Britton & P. Wilson, Bot. Porto Rico 5: 156. 1923.

References: García-Mendoza, A. & F. Chiang. 2003. The confusion of *Agave vivipara* L. and *A. angustifolia* Haw., two distinct taxa. Brittonia 55: 82-87. Gentry, H. C. 1982. *Agave* of Continental North America. 670 pp. Univ. of Arizona Press. Trelease, W. 1913. *Agave* in the West Indies. Mem. Natl. Acad. Sci. 11: 1-55, t. 1-116. 1913.

Key to the species of *Agave*

1. Leaf-margins straight, the marginal prickles usually not over 5 mm long, with lenticular bases. 2
2. Flowers bright yellow (native species). 3
3. Inflorescences ca. 1.2 m tall; leaves less than 1 m long. ..... 2. *A. minor*
3. Inflorescences 3-7 m tall; leaves to 2.75 m long. 4
4. Leaves less than 15 cm wide; marginal prickles 1-1.5 mm long (St. Croix) ..... 1. *A. eggersiana*
4. Leaves up to 25 cm wide; marginal prickles mostly 2-5 mm long (rarely more) (Puerto Rico & Virgin Islands, except St. Croix) ..... 3. *A. missionum*
2. Flowers pale greenish or yellowish green (introduced species, often cultivated, sometimes naturalized). 5
5. Leaves dark green, less than 8 cm wide, with many marginal prickles; perianth 2-3 cm long ..... 5. *A. vivipara*
5. Leaves gray-green, glaucous (at least at first), 10-12 cm wide, with smooth margins or with few marginal prickles; perianth 4-6 cm long ..... 4. *A. sisalana*
1. Leaf-margins undulate, the marginal prickles up to 10 mm long, borne on dilated bases of leaf-tissue 6

6. Leaves whitish gray-green, strongly arching and often recurved; often cultivated but so far naturalized or seen flowering in the West Indies ..... [*A. beauleriana*]
6. Leaves gray-green, straight, mostly erect; capsules black, up to 6 cm long ..... [*A. americana*]

1. Agave eggersiana Trel., Mem. Natl. Acad. Sci. 11: 28, t. 31-33. 1913. Type: St. Croix, U.S. Virgin Islands. *Ricksecker 282* (US!).

Acaulescent plant. Leaves numerous, forming a rosette, narrowly lanceolate, mostly 1.2-2 m long, nearly straight and erect, apex with a brown, terminal, awl-shaped, spine, 1.5-2 cm long, margins with straight or up-curved prickles 1-1.5 mm long, with broadly lenticular blackish brown base. Inflorescence to 5 m tall or more, the scape bearing distant deltate bracts, the slightly ascending branches densely-flowered. Flowers deep yellow, on pedicels 2-2.5 cm long; ovary 2-3 cm long, nearly equaling the length of the perianth, the whole flower (excluding the stamens) thus 5-6 cm long; filaments 4.5-5 cm long, nearly twice as long as the tepals. Fruits unknown; after flowering, the panicles produce numerous vegetative bulbils by which the species can be propagated.

General distribution: Endemic to St. Croix, where it now appears to be extinct in the wild. Now cultivated in St. Croix and St. Thomas, but relatively few plants exist.

Selected specimens examined: St. Croix: Christiansted: *Rose et al. 3535* (US); District of Prince: S side of Alexander Hamilton Airport, *Proctor et al. 45490* (US-2).

2. Agave minor Proctor, sp. nov. Type: Puerto Rico. Cabo Rojo; Bo. Llanos Costa: Outlying s ridge of Sierra Bermeja, between Rancho Cassaba and Arroyo Cajul, elev. 100-200 m, 15 Jun 1991 (fr), *Proctor, Judd, and Rivera 46978* (holotype: SJ, pictures at NY UPRRP, US!).

A Agave missionum Trelease inflorescentia, foliis et fructibus minoribus differt.

Acaulescent, the plants clustered by means of short stolons. Leaves ascending to erect in a tight rosette, lanceolate or narrowly elliptic, 40-60 × 4.5-6 cm, the apical spine needle-like, up to 3 cm long, the marginal prickles ca. 1 mm long, mostly spaced 6-10 mm apart. Inflorescence (1 seen) 1.2 m tall, the axis ca. 90 cm long, ca. 1.5 cm in diam. near the base, tapering to ca. 0.7 cm at base of panicle; scape-bracts widely separated, deltate-acuminate with spinose apex, 3-4.5 cm long. Inflorescence branches few, short, ascending, with peduncles 1.5-4 cm long, the flowers densely clustered on very short branches from the apex. Perianth (only dried withered ones seen), yellow, ca. 1.5 cm long. Capsules rounded-oblong, ca. 2 cm long, 1.4-1.6 cm in diam., deeply grooved between locules; seeds angular, rugose, ca. 5 mm wide.

Agave minor differs from any other native *Agave* species by its shorter leaves and inflorescences.

General distribution: Known only from a population of several individuals, in dry scrubland.

3. Agave missionum Trel., Mem. Natl. Acad. Sci. 11: 37. 1913. Type: St. Thomas, U. S. Virgin Islands. *Trelease 15* (holotype: MO).

Agave portoricensis Trel., Mem. Natl. Acad. Sci. 11: 38. 1913. Type: Puerto Rico; between Coamo & Aibonito. *Trelease 7* (holotype: MO?).

Figs. 27. A-E; 61. E

Acaulescent, not proliferating by stolons or offsets; leaves fleshy, forming a large rosette, lanceolate to broadly lanceolate, mostly 0.9-2.75 m × 13-23 cm, dark glossy green, acuminate to a spinose apex, the apical spine awl-shaped, 1.5-2.5 cm long, brown, smooth, decurrent at base and dorsally produced into the green leaf-tissue; marginal prickles brown or blackish, 3-5 (-6) mm long, straight or variously recurved, mostly spaced 7-15 mm apart. Inflorescence an elongate stalked panicle up to 7 m tall, the scape about equaling the flowering part; main-panicle-branches horizontal or sometimes slightly ascending, bearing dense cymose clusters of erect yellow flowers; pedicels 1.5-2 cm long. Flowers 4.5-5.5 cm long including ovaries ca. 2 cm long. Stamens long-exserted, with falcate anthers 1.4-1.7 cm long. Style 4-5 cm long, with a 3-lobed stigma. Capsules broadly oblong-ellipsoid or somewhat turbinate, 2.5-3.5 cm long, 1.8-2.5 cm in diam. Seeds flat, irregularly and obtusely triangular, 5-9 mm wide. Many plants

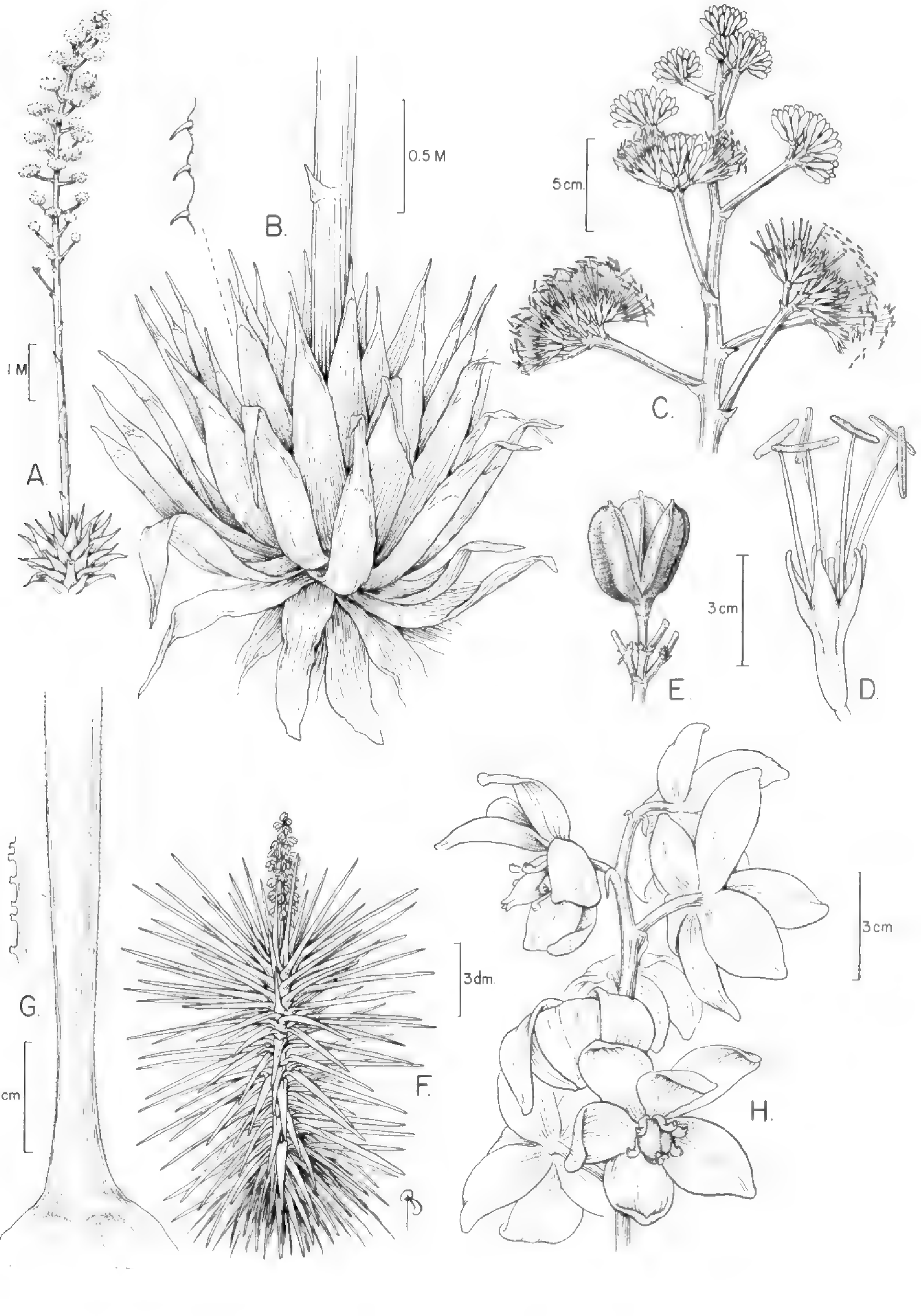


Fig. 27. A-E. *Agave missionum.* **A**. Habit. **B.** Basal rosette of leaves and detail of leaf margin. **C.** Upper portion of inflorescence. **D**. Flower. **E**. Dehisced capsule. **F-H.** *Yucca aloifolia.* **F**. Habit. **G**. Basal portion of leaf, and detail of margin. **H**. Upper portion of inflorescence with open flowers. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

produce vegetative bulbils on the inflorescence, sometimes mixed with capsules, or sometimes in the absence of capsules.

General distribution: Endemic to Puerto Rico and the Virgin Islands, but absent from St. Croix.

Distribution in Puerto Rico and the Virgin Islands: In dry, rocky, mostly non-calcareous habitats from near sea level to ca. 800 m elevation. Recorded from Aibonito, Coamo, Culebra, Guánica, Sabana Grande, Salinas, and Vieques; Anegada, Guana Island, St. John, St. Thomas, Tortola, and Virgin Gorda; also present on many of the smaller islets.

Common names: Puerto Rico: *Cocuiza, Maguey;* Virgin Islands: *Karata.*

Note: This species is somewhat variable in several characters, including size of marginal leaf-prickles, shape of panicle, texture of capsules, and presence or absence of bulbils.

Selected specimens examined: PUERTO RICO: Coamo: vicinity of Coamo Springs, *N.L. Britton & Brown 5702* (US). Coamo-Aibonito, *Stevenson 6934* (US). Culebra: *N.L. Britton & Wheeler 236* (US). Guánica: Ensenada, *Britton et al. 8322* (US); Montalva, *N.L. Britton et al. 4878* (US). Sabana Grande, *Sargent 755* (US). Salinas: Bo. Río Jueyes, *Proctor & Díaz 44753* (US-2); Bo. Lapa, *Proctor et al. 43725* (US-2). Vieques: Ensenada Honda to Puerto Medio, *Shafer 3018* (US). ST. JOHN: Lameshur: *N.L. Britton & Shafer 497* (US). TORTOLA: Guana Island, *Proctor 43413, 43699* (US).

4. Agave sisalana Perrine, House Rep. Document 564: 87. 1838. Neotype: Mexico; Chiapas. Ocosocoautla, *Gentry 16434* (US), designated by H.S. Gentry, *Agaves* Cont. N. Amer. 628. 1982.

Fig. 61. G

Acaulescent or sometimes with a short caudex up to 1 m tall; plants spreading by numerous stolons. Leaves linear-lanceolate, to 1.5 m long, 10-12 cm wide, the central ones rigidly erect, but many of the outer ones more or less reflexed, glaucous gray-green at first, becoming green; apical spine conic-subulate, 2-2.5 cm long, shallowly round-grooved at base; margins usually smooth but sometimes with small scattered prickles. Flowers in clusters of 2 or 3 on the many panicle-branches; perianth 4-6 cm long, yellowish green; stamens inserted at the level of perianth-fusion, the filaments linear, red-spotted, 7.5-8 cm long; anthers 2.5-2.7 cm long, brown-spotted. Ovary 2-2.5 cm long with style becoming 7-8 cm long. Capsules rarely formed, oblong, up to 6 cm long, 2-2.5 cm in diam., stipitate and beaked; seeds (if any) probably not viable. Vegetative bulbils commonly produced below the flowers in the axils of bracts. Cytologically this species is a sterile pentaploid evidently of hybrid origin.

General distribution: Probably native in the region of Chiapas, Mexico (Gentry, 1982), but now grown all over the world in hot dry regions as a source of useful textile fibers. It often persists indefinitely in abandoned plantations, and easily becomes naturalized.

Distribution in Puerto Rico and the Virgin Islands: No voucher specimens from Puerto have been seen except from Mona Island, but this species is definitely naturalized in parts of the Guánica State Forest, and can be expected to occur elsewhere. In the Virgin Islands it was long ago recorded from St. Croix as "established" by Trelease (1913).

Common name: Puerto Rico: *Sisal.*

Note: In 1982, Gentry (p. 628) neotypified the name of this species with one of his own specimens from Chiapas, Mexico, without mentioning the original material collected by Perrine.

Selected specimens examined: PUERTO RICO: Mona Island, *Acevedo-Rdgz. & Siaca 4373* (FTG, NY, SJ, US).

5. Agave vivipara L., Sp. Pl. 323. 1753. Lectotype: C. Commelijn, *Praeludia Bot. t. 15.* 1703, designated by Wijnands, Bot. Commelins. 35. 1983.

Acaulescent rosette plants sometimes developing a short trunk; freely surculose. Leaves narrowly linear to lanceolete, 40-75 cm × 3.5-8 cm, the apical spine 2.4-4 cm long, the upper surface flat, the marginal prickles black, 2-5 cm long, up-curved, sinuous or recurved from a black deltoid base. Inflorescence up to 3 m tall or more, the scape-bracts spreading; flowers pale green, the tepals shading to light yellow toward the tips, the perianth ca. 2 cm long. Capsules subglobose to broadly ovoid, 3-5 cm long. Proliferous bulbils often produced on the inflorescence-branches after flowering.

General distribution: Occurs widely, both naturally and under cultivation, from northwestern most Mexico to Nicaragua; commonly cultivated in the West Indies and probably in most warm countries, sometimes escaping and becoming naturalized.

Distribution in Puerto Rico and the Virgin Islands: Frequently cultivated in Puerto Rico, especially a yellow-margined variant (*A. vivipara* '*marginata*' (Gentry) P. Forst., Brittonia 44: 74. 1992). The non-marginate form is recorded from "Tortuguero area"; escaped on Guana Island

Selected specimens examined: PUERTO RICO: Manatí (?): Tortuguero, *Liogier et al: 33548*, 28 Oct. 1982 (UPR).

Cultivated Species

Agave americana L., a Mexican species sometimes cultivated in Puerto Rico and the Virgin Islands, apparently is not naturalized. *Agave beauleriana* Jacobi is sometimes cultivated in Puerto Rico. In addition to these, Britton and P. Wilson (1923) listed the following as cultivated: *A. fourcroydes* Lem., of Yucatan, planted for fiber in Puerto Rico and the Virgin Islands; and *A. evadens* Trel., native of Trinidad, *A. jacquiniana* Schult., and *A. neglecta* Small, endemic to Florida, U.S.A., as all cultivated in St. Thomas at Louisenhoj.

2. FURCRAEA

Furcraea Vent., Bull. Sci. Soc. Philom. Paris 1: 65. 1793.

Monocarpic, large rosette-forming, mostly acaulescent herbs. Leaves elongate, often longitudinally ridged, usually green and of thick texture, spine-tipped and with marginal teeth or sometimes the margins smooth. Inflorescence a large open panicle, the axis bearing large triangular bracts. Flowers clustered along the branches, more or less pendulous; perianth funnelform, the 6 segments spreading, white or greenish white. Stamens shorter than the perianth, borne on the bases of the tepals, the filaments with swollen bases. Ovary inferior, 3-locular, with many ovules, the style angulate and thickened below, the stigma capitate. Capsules oblong, 3-angled; seeds flat, numerous. Capsules and viable seeds are seldom produced, but reproduction is frequently accomplished by means of vegetative bulbils formed on the inflorescence. A Neotropical genus of about 20 species.

Lectotype: *Furcraea cubensis* (Jacq.) Vent. (≡ *Agave cubensis* Jacq.), (= *Furcraea hexapetala* (Jacq.) Urb.), designated by Britton, Fl. Bermuda 80. 1918.

References: Álvarez de Zayas A. 1996. El género *Furcraea* (Agavaceae) en Cuba. Anales Inst. Biol. Univ. Nac. Autón. México, Bot. 67(2): 329-346. Drummond, J.H. 1907. The literature of *Furcraea* with a synopsis of the known species. Rep. (Annual) Missouri Bot. Gard. 18: 25-75.

Key to the species of *Furcraea*

1. Leaves with marginal prickles mostly paired; flowers solitary along main axis of inflorescence; tepals cream ..... 2. *F. stratiotes*
1. Leaves with marginal prickles solitary, sometimes few or lacking; flowers clustered along secondary inflorescence branches; tepals greenish white 2
    2. Leaves narrowly lanceolate or narrowly elliptic, with marginal prickles 0.5-2 cm apart; bulbils fusiform; tepals 1.4-1.9 cm long ..... 1. *F. antillana*
    2. Leaves widely lanceolate or elliptic, with marginal prickles 1.5-4(8) cm apart; bulbils ovoid; tepals 2.4-2.7 cm long ..... 3. *F. tuberosa*

1. Furcraea antillana A. Álvarez, Anales Inst. Biol. Univ. Nac. Autón. México, Bot. 67(2): 331. 1996. Type: Cuba. Havana. *A. Álvarez 63654* (holotype: HAJB).

Large monocarpic plants. Leaves in a rosette, narrowly oblong-lanceolate (60)90-120(200) × 5-10 cm, acute or acuminate at apex with a blunt or sharp terminal spine, the margins with numerous

curved prickles 2-5(7) mm long, brown to almost black, sometimes prickles few and widely scattered. Inflorescence 4-6 m tall, with branches on the 2 upper thirds. Flowers in small clusters of 2 or 3, greenish white; pedicels 0.4-1 cm long; tepals elliptic, (1.2)1.4-1.9(2.7) cm. Stamens 1.2-2.4 cm long. Ovary trigonous, 1.8-2 cm long. Capsules oblong, 2.5-5.0 × 1.6-3 cm; seeds 8-12 mm long. Bulbils fusiform.

General distribution: Cuba, Hispaniola and Puerto Rico.

Distribution in Puerto Rico: Known from two collections, one from Morovis (*Sintenis 6854*, US) the other from Vega Baja (*Howard et al. 16988*).

2. Furcraea stratiotes J. B. Petersen, Bot. Tidsskr. 37: 306. 1922. Type: Nicaragua (from a plant brought into cultivation in the Copenhagen Botanical Garden, by Oersted in 1848). *Boye-Petersen s. n.* (holotype: C).

Acaulescent or nearly so; leaves many, linear-lanceolate, up to 1 m long, and 7 cm wide near-the middle, light green, the apex with an awl-shaped indurate portion ca. 1 cm long, tipped with a mucron, the margins bearing numerous mostly twinned prickles, 1-3 mm long, those of a pair usually turned away from each other. Inflorescence slender, up to 4 m tall or more, bipinnate, the ultimate branchlets flexuous or up-curved, often bulbiferous, the bulbils to 3.5 cm long, strongly flattened or compressed, with 3-5 leaves usually showing. Lower scape bracts ca. 6 cm long, 2 cm broad, obtuse, the margins minutely denticulate; upper bracts smaller, acuminate, entire. Flowers solitary, cream-colored; pedicels 0.5-1 cm long; tepals ca. 1.4 cm long; filaments 2.5 mm long, ca. 1 mm thick at base, subulate toward apex, with anthers 4 mm long, 1.5 mm thick. Ovary 8 mm long, obtusely triangular; style 5 mm long. Capsules and seeds unknown.

General distribution: Endemic to Nicaragua, but naturalized in the Virgin Islands.

Distribution in the Virgin Islands: Naturalized on St. Croix (rocky hillsides near Eliza's Retreat) and cultivated in several St. Croix gardens. There was a general flowering of the wild population during early November, 1997. It is presumed that the species may have been introduced from Copenhagen, Denmark, after its first known flowering (and production of bulbils) in 1921. *F. stratiotes* has not been rediscovered in Nicaragua since its first collection by the Danish botanist Oersted in 1848, and St. Croix is therefore the only known locality where this species occurs in the wild.

3. Furcraea tuberosa (Mill.) W.T. Aiton, Hort. Kew. ed. 2, 2: 303. 1811; *Agave tuberosa* Mill., Gard. Dict. ed. 8, Agave no. 4. 1768. Type: Hispaniola. *Plukenet, Phytogr. t. 258 f. 1.* 1691.

Furcraea hexapetala sensu Urban, 1903, non Jacquin, 1760.

Figs. 28. A-G; 62. A, B

Large monocarpic plants. Leaves in a rosette, broadly oblong-lanceolate up to 1.5 m long or more, 13-18 cm broad near the middle, acuminate at apex with a blunt or sharp terminal spine, the margins usually with numerous straight prickles 2-4 mm long, or sometimes prickles few and widely scattered. Inflorescence to 7 m tall, the upper half loosely paniculate. Flowers solitary or often in small clusters of 2 or 3, pale green or greenish white, fragrant; pedicels 0.6-1 cm long; tepals more or less oblong, 2.4-2.7 × 0.9-1.5 cm. Stamens much shorter than the perianth. Ovary linear or narrowly oblong-linear, up to 2 cm long, perhaps not functional. Capsules and seeds unknown; the species reproduces entirely by means of vegetative bulbils borne on the inflorescence after flowering.

General distribution: Greater and Lesser Antilles.

Distribution in Puerto Rico and the Virgin Islands: Apparently native, but also cultivated. Recorded from Bayamón, Cidra, Culebra, Fajardo, Guayanilla, Maricao, Morovis, Ponce, Rincón, Sabana Grande, San Germán, San Juan, San Sebastián, Vega Baja, Vieques, and Yauco; St. Croix and St. Thomas.

Note: This species was incorrectly considered by R.A. Howard (Fl. Lesser Antill. 3: 499. 1979) to be endemic to the Lesser Antilles. The type of the species is from the island of Hispaniola and its identity applies to plants known from the Greater and Lesser Antilles as well.

Common names: Puerto Rico: *Cocuisa, Maguey, Maguey criollo.*

Selected specimens examined: Puerto Rico: Cidra: Bo. Rabanal, roadside cliffs of Cerro Viento Caliente, 560 m, *Proctor et al. 47640* (SJ, US).

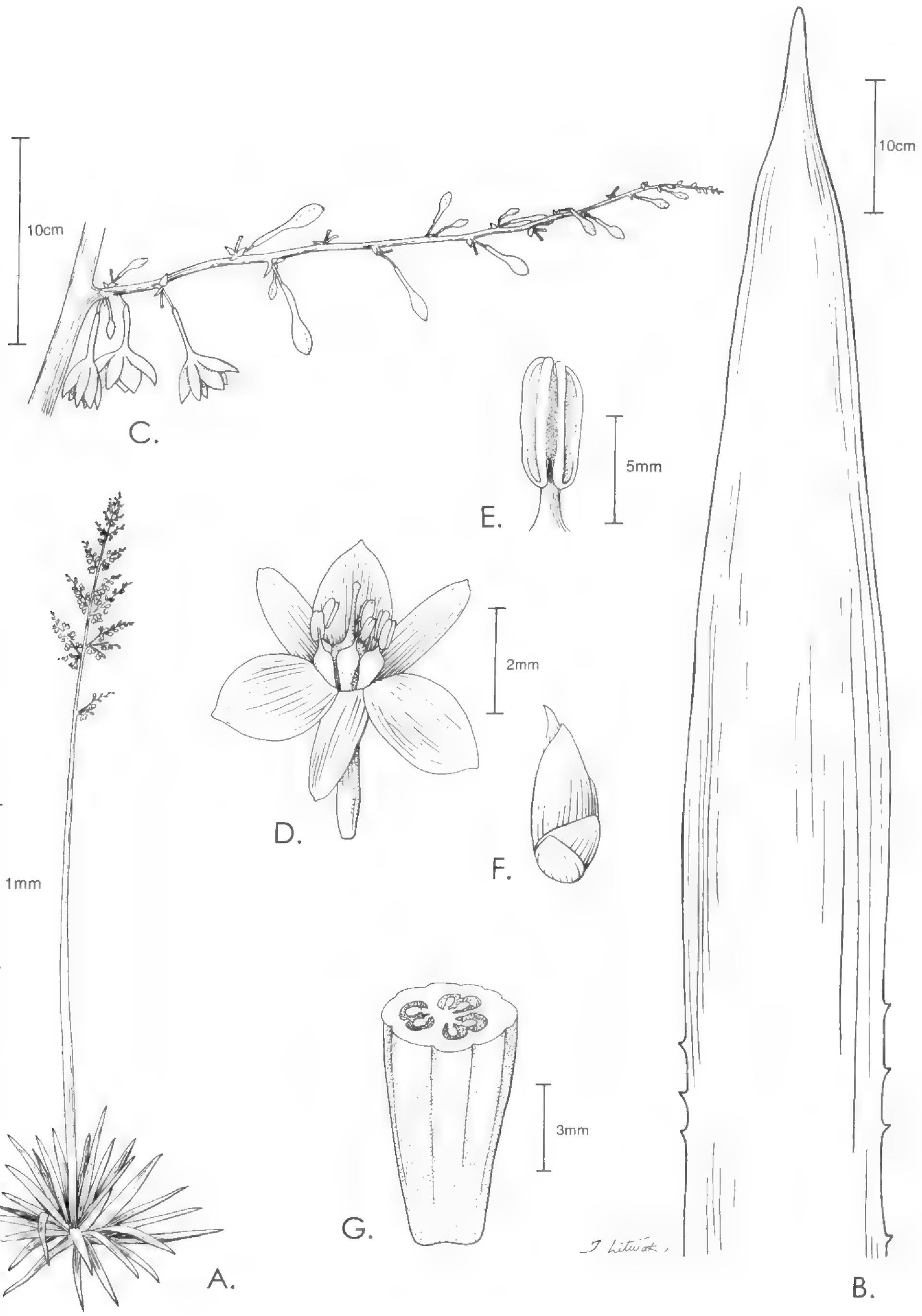


Fig. 28. A-G. *Furcraea tuberosa.* **A.** Habit. **B.** Portion of leaf. **C.** Inflorescence branch. **D.** Flower. **E.** Stamen. **F.** Vegetative bulbil. **G.** C.s. of fruit showing 3-locular ovary and ovules. (A, Photo; B, from *Proctor 43844*; C-G, from *Proctor 42326*).

Culebra: *N.L. Britton & Wheeler 242* (US). Fajardo: *Heller & Heller 817* (US). Guayanilla: *N.L. Britton & Shafer 1801* (US). Maricao: *Sargent 417* (US). Morovis: Bo. Frances, *Sintenis 6854* (US). Sabana Grande: *Cust s.n.* (US). San Juan: *Gardner s.n.* (US-5). Vieques: *Shafer 2913* (US). Yauco: *Underwood & Griggs 722* (US). St. Croix: Bassin, *Ricksecker 298* (US). St. Thomas: *Morrow 71* (US).

Cultivated Species

At least two other species (*F. foetida* (L.) Haw. and *F. selloa* K. Koch cv. "*marginata*") have been cultivated in St. Croix and also possibly in St. Thomas. Also, Britton & P. Wilson (1923) stated that *F. elegans* Tod. had been planted in St. Thomas and *F. andina* Trel. (native to Peru) and *F. macrophylla* Baker (of the Bahamas) were planted at the Agricultural Experimental Station at Mayagüez, Puerto Rico. The fate of these plants is unknown; most probably they are no longer extant.

3. YUCCA

Yucca L., Sp. Pl. 319. 1753.

Shrubby or tree-like woody plants with simple or branched stems, the leaves crowded in a tight spiral at the ends. Leaves thick, rigid, spinose at the apex, the margins entire, denticulate or filiferous. Inflorescence a large terminal panicle; flowers pedicellate, usually pendent or directed somewhat downward; perianth-segments (tepals) lance-ovate, distinct, often succulent; stamens 6, with short stout filaments. Ovary sessile or short-stalked, 3-locular, with numerous ovules. Fruit a fleshy or chartaceous capsule; seeds black, compressed. A New World genus of about 40 species occurring in the southern United States, Mexico, and the West Indies.

LECTOTYPE: *Yucca aloifolia* L., designated by Britton & Shafer, N. Amer. Trees 151.1908.

Key to the species of *Yucca*

1. Leaves 35-60 cm long, less than 3.5 cm wide near the middle; filaments free, longer than the ovary; ripe fruits with purple pulp and without a papery core ..... 1. *Y. aloifolia*
1. Leaves to 100 cm long and up to 5 cm wide or more; filaments adnate to and shorter than the ovary; ripe fruits with white or yellowish pulp and a papery core ..... 2. *Y. guatemalensis*

1. Yucca aloifolia L., Sp. Pl. 319. 1753.
Lectotype: Dillenius, *Hort. Eltham. t. 323, fig. 416.* 1732, designated by Wijnands, Bot. Commelins. 140. 1983.

Figs. 27. F-H; 62. C, D

Stems erect, woody, simple or branching, most often 1-3 m tall, seldom more than 5 m tall. Leaves numerous in a tight spiral, dark green, rigid, thick, narrowly lanceolate or linear-lanceolate, 30-60 cm long (rarely more), mostly 2-3.5 cm wide (rarely wider), dilated at base, the apex armed with a sharp, cylindrical, brown or blackish spine; margins usually minutely denticulate. Inflorescence a dense, erect, terminal panicle 20-70 cm long; flowers numerous, nodding, campanulate, succulent, creamy-white (sometimes purple-tinged toward base), the tepals 3-5.8 cm long. Stamens hypogynous, free, thickened towards apex, the anthers versatile. Ovary short-stalked. Fruit an indehiscent fleshy capsule, oblong-ellipsoid, mostly 4-6 cm long (rarely longer), 1.7-2.5 cm in diam. (rarely to 4 cm), blackish with dark purple pulp. Seeds shiny black, flattened, round or oval, 5-6 × 6-7 mm.

General distribution: Florida to Louisiana, Mexico, Bermuda, Bahamas, Greater Antilles, Cayman Islands, and Lesser Antilles. This species has often been planted as an ornamental and tends to persist after cultivation and become naturalized, so that its true natural distribution cannot be determined with certainty.

Distribution in Puerto Rico and the Virgin Islands: Recorded from Carolina and Loíza, where

it grows in sandy coastal thickets. In the Virgin Islands, recorded from St. Croix and St. John, but probably occurs on other islands.

Common names: Puerto Rico. *Aguja de Adán, Bayoneta española, Mata de huevo.*

Selected specimens examined: PUERTO RICO: Carolina: Bo. Torrecilla Baja, E of Punta Vacia Talega, *Axelrod & Thomas 12689* (UPRRP). ST. CROIX: *Fosberg 59209* (US). ST. JOHN: Coral Bay Quarter; Emmaus along Rt. 107, *Acevedo-Rdgz. & Reilly 2008* (NY, UPR, UPRRP, US, VINPS).

2. Yucca guatemalensis Baker, Refug. Bot. 5: t. 313. 1872; *Yucca elephantipes* E. Regel ex Trel., Rep. (Annual) Missouri Bot. Gard. 13: 94. 1902, nom. illeg. Type: Guatemala. (based on material cultivated in England). Baker, *Refug. Bot. 5, t. 313.* 1872.

Stems erect, woody, tree-like, often 10 cm thick or more, branched, up to 10 m tall or more. Leaves numerous in moderately dense spiral clusters toward ends of branches (the trunk and lower parts of the branches naked with somewhat rough bark), narrowly lanceolate, up to 1 m long and 4-5 cm wide near the middle, gray-green and of hard, rigid texture, tapering toward base and long-acuminate at the apex, terminating in a long, sharp, needle-like spine, the margins very minutely serrulate. Inflorescence a dense, erect, terminal panicle usually 65-90 cm long, with numerous nodding white or creamy-white flowers of succulent texture, on pedicels up to 2.5 cm long; corolla campanulate, with narrowly elliptic tepals mostly 3-4 cm long. Stamens hypogynous, the short, thick filaments closely appressed to the lower half of the ovary, the short anthers opening introrsely. Ovary oblong, capped by a short style and 3 bifid stigmatic lobes ca. 3.5 mm long. Capsules oblong-ovoid, up to 9 cm long, containing white or yellowish pulp and a papery core.

General distribution: Naturally occurring in the lowlands of Guatemala, ascending to medium heights in the mountains, and occurring commonly in cultivation and naturalized from Mexico to Costa Rica, also widely cultivated in the West Indies. The flowers are edible and are a common article of food in Guatemala and adjacent areas. They can be eaten raw, but are usually dipped in egg and fried, or included in an omelet, or used as a vegetable ingredient of soups and meat stews. These culinary uses are generally unknown in the West Indies.

Distribution in Puerto Rico and the Virgin Islands: Frequently planted in Puerto Rico; in St. Croix it has become somewhat naturalized in roadside thickets toward the western end of the island.

Common name: Puerto Rico: *Bayoneta.*

Selected specimens examined: ST. CROIX: Estate Thomas Exp. Forest, 3 mi W of Christiansted, *Little 23037* (US). Virgin Island Agric. Exp. Station, *Little 21521* (US).

Cultivated Species

Yucca gloriosa L., a native of the southeastern United States, was grown in Puerto Rico gardens and is occasionally adventive on roadsides (Britton & P. Wilson, 1923).

CULTIVATED GENERA

Polianthes tuberosa L., a native of Mexico, is cultivated in Puerto Rico (commonly known as *Azucena*) for floral arrangements and in Virgin Islands gardens.

Family 16. **ASPARAGACEAE** *Asparagus Family*

Asparagaceae Juss., Gen. Pl. 40. 1789, *nom. conserv.*

by P. Acevedo-Rodríguez, M.T. Strong & G. R. Proctor

Shrubs, sub-shrubs, or vines, usually glabrous with woody or often partly herbaceous, evergreen or annually withering branches growing from a rhizome; roots often swollen and fusiform; many species

have green photosynthetic ultimate branchlets, and a few have ultimate branchlets transformed into flattened leaf-like phylloclades. Leaves, if present are usually reduced and often minute or scale-like. The needle-like "leaves" of commonly grown species are actually much-reduced stems. Flowers small, solitary or few to many in racemes or umbels; perianth campanulate with 6 free or fused segments, these all similar, bisexual or unisexual (the plants dioecious), inconspicuous, white, yellowish or green in color. Stamens 6 with free filaments attached at the base of the perianth; anthers dorsifixed, introrse. Ovary superior, 3-locular, with 2-12 ovules per locule. Fruit a globose berry, often red or blue; seeds with black epidermis and endosperm lacking starch. An Old World family of more than 300 species mostly of arid habitats in Africa, the Mediterranean region, and western Asia; most are tropical or subtropical, but a few can grow in temperate areas.

TYPE: *Asparagus* L.

1. ASPARAGUS

Asparagus L., Sp. Pl. 313. 1753.

Asparagopsis (Kunth) Kunth, Enum. Pl. 5: 76. 1850, non Mont., 1840. *Protasparagus* Oberm., S. African J. Bot. 2: 243. 1983.

Erect or scandent and twining shrubs or sub-shrubs with tuberous roots. Leaves absent or reduced to tiny scales. Photosynthetic function carried out by verticillate or fasciculate needle-shaped or leaf-shaped cladodes. Flowers bisexual, actinomorphic, minute, in racemes or dispersed among the phylloclades; perianth of 6 free segments; stamens 6; ovary superior, 3-locular, with 4-10 ovules per locule, and three stigmata. Fruit a berry; seeds globose, smooth, black. A genus of about 100 species, naturally distributed in the S and N of Africa and Asia.

Protasparagus Oberm., is here considered part of *Asparagus* as further analysis by Malcomber & Sebsebe Demissew (1992) does not support Obermeyer's generic concept.

LECTOTYPE: *Asparagus officinalis* L., designated by Britton and A. Brown, Ill. Fl. N. U.S. ed. 2. 1: 313. 1913.

References: Malcomber, S. T. & S. Demissew. 1992. The status of *Protasparagus* and *Myrsiphyllum* in the Asparagaceae. Kew Bull. 48: 63-79. Straley, G. B. & F. H. Utech. 2002. Fam. 222. Liliaceae: *Asparagus*. Pp. 213-214. *In:* Flora of North America Editorial Committee (eds.), Fl. North Amer., vol. 26.

Key to the species of *Asparagus*

1. Cladodes (leaf-like stems) flattened, solitary or few in a fascicle; inflorescence an axillary raceme, 5 to 9(–17)-flowered; pedicels 5–8 mm long; berry red ..... 1. *A. aethiopicus*
1. Cladodes (leaf-like stems) filiform, arranged in hemispherical to spherical fascicles, numerous in each fascicle; inflorescence a terminal umbel, 1- to 4-flowered; pedicels 1–3 mm long; berry purplish black ..... 2. *A. setaceus*

1. Asparagus aethiopicus L., Mant. Pl. 63. 1767; *Protasparagus aethiopicus* (L.) Oberm., S. African J. Bot. 2: 243. 1983. Neotype: South Africa; Cape. (LINN-434.6), designated by Obermeyer, S. African J. Bot. 2: 243. 1983.

Asparagus sprengeri sensu authors, non Regel, 1890.

Asparagus densiflorus sensu authors, non (Kunth) Jessop, 1966.

Scandent sub-shrub, scrambling or climbing to 3 m; rhizome short and stout with elongate fibrous roots that often form tubers. Stems firm, woody, with numerous striate-ridged branches; cladodes solitary or in fascicles of 2-5 per node, linear, flattened, straight or curved, 8–30 × 1.5-2.5 mm, with a single prominent or sometimes inconspicuous vein; leaves scale-like, membranous, 1–2 mm long, spurred at base and bearing a spine. Inflorescences axillary racemes, 5– to 9(–17)-flowered; bracts linear, 2-5 mm long. Flower pedicels 5–8 mm long, articulate at middle;

perianth rotate to campanulate, the segments oblong-ovate, white to pale pink, 3–4 × 1.5–2 mm; pedicel. Berries red, 5–10 mm diam.; seeds 1.

General distribution: Native of South Africa; widely cultivated elsewhere and sometimes persisting or becoming naturalized.

Distribution in Puerto Rico: Naturalized at several localities.

Common names: Puerto Rico: *Cabellera de la reina, Canastillo, Espárrago de jardín.*

Selected specimens examined: PUERTO RICO: San Juan: Río Piedras, *Stevenson 2735* (US). Utuado, Cerro Roncador, escaped, 25 Aug 1981 (fr), *Liogier et al. 32198* (UPR).

2. Asparagus setaceus (Kunth) Jessop, Bothalia 9: 51. 1966; *Asparagopsis setaceus* Kunth, Enum. Pl. 5: 82. 1850; *Protasparagus setaceus* (Kunth) Oberm., S. African J. Bot. 2: 244. 1983. Lectotype: South Africa; Cape. *Drege 8584c* (KIEL), designated by Jessop, Bothalia 9: 51. 1966.

Fig. 29. A-E

Twiner, 2-3 m long. Stems cylindrical, tough, green, spiny at the base, much-branched, the ultimate branches and cladodes close together in flat, frond-like whorls. Cladodes filiform, needle-like, numerous in close fascicles. Flowers axillary,

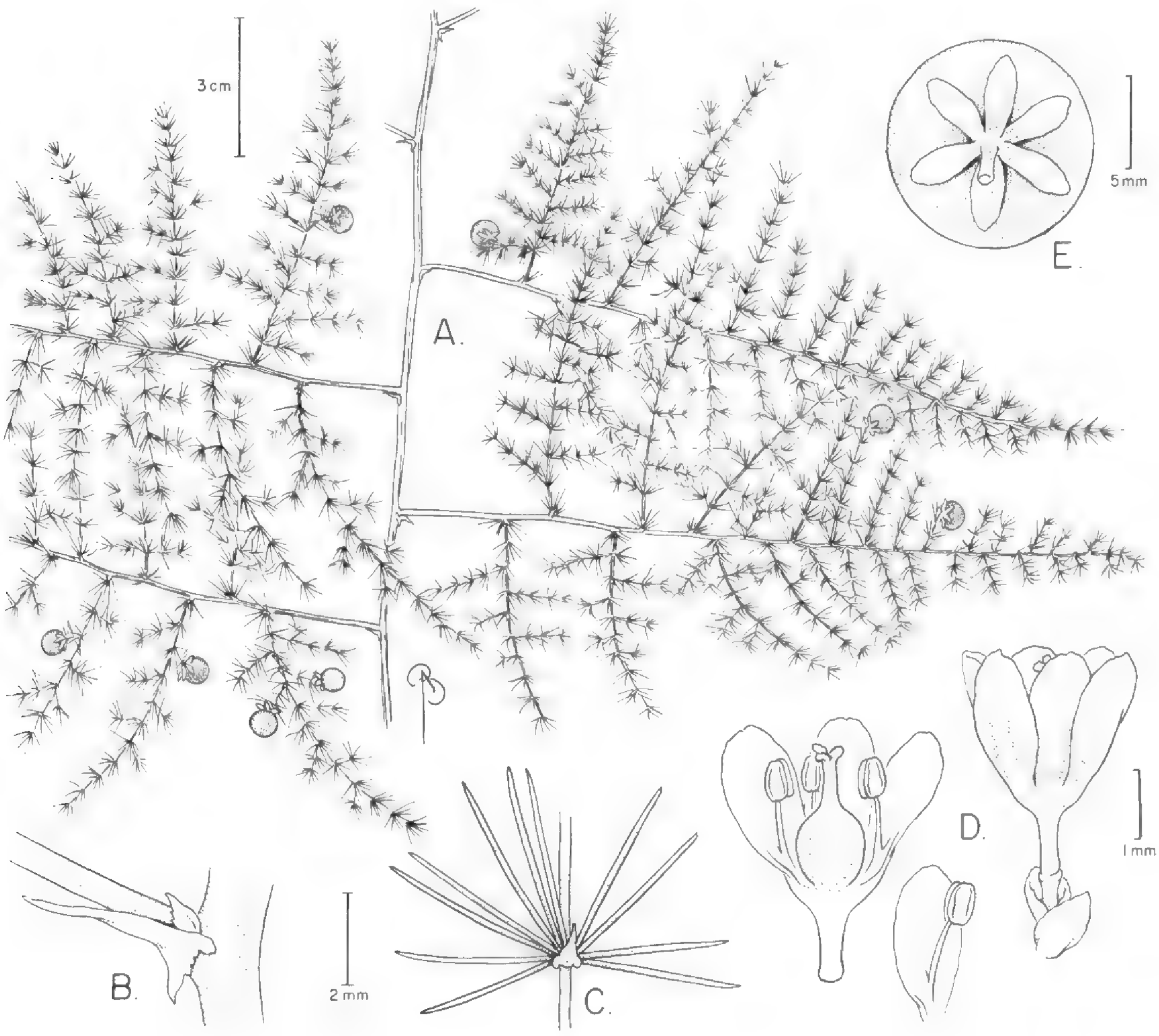


Fig. 29. A-E. *Asparagus setaceus*. **A.** Fruiting branch. **B.** Base of lateral branch. **C.** Cladodes. **D.** Flower, side view, with perianth removed, tepal with adnate stamen, and side view. **E.** Fruit, basal view, showing sepals. From Acevedo-Rdgz., P. 2003, Bejucos y plantas trepadoras de Puerto Rico e Islas Vírgenes, Smithsonian Institution.

hanging, solitary or up to 4 together; pedicels 2-2.4 mm long; perianth segments pale green, oblong, obtuse, ca. 2.5 mm long. Berries olive green to black, globose, ca. 5 mm in diam..

General distribution: Native of South Africa; widely cultivated elsewhere and sometimes persisting or becoming naturalized.

Distribution in Puerto Rico and the Virgin Islands: A commonly cultivated plant in Puerto Rico and the Virgin Islands. Collected in Maricao and San Juan; St. Thomas (no record of being naturalized).

Common names: Puerto Rico: *Abeto, Ala de pájaro, Helecho plumoso.*

Selected specimens examined: PUERTO RICO: Maricao: Hacienda Juanita, *Acevedo-Rdgz. et al.* 7067 (US). San Juan: Botanic Garden, Río Piedras, *Oquendo 155* (US).

Cultivated Species

Asparagus officinalis L., the common Asparagus vegetable, is sometimes cultivated in Puerto Rico. In addition to this taxon, Britton & P. Wilson (1923) listed *Asparagus plumosus* Baker, a native of South Africa, as grown in Virgin Islands (St. Thomas: *Morrow 87,* US) and Puerto Rico gardens.

Family 17. **DRACAENACEAE** *She-dragon Family*

Dracaenaceae Salisb., Gen. Pl. 73. 1866, *nom. conserv.*

by G. R. Proctor

Trees or shrubs with woody stems or else short-stemmed or acaulescent succulent herbs with fleshy creeping rhizomes; woody stems usually with secondary thickening. Leaves entire, lanceolate or linear-lanceolate to ovate and flat, channeled, cylindrical or laterally compressed, sessile, glabrous, fleshy or leathery, rigid or flexible, often clustered at growing tips or in rosettes at the ends of branches. Inflorescence an axillary raceme or panicle; flowers bisexual, hypogynous, often fragrant; pedicels articulate; perianth tubular or funnel-shaped, the lobes 6, narrow, subequal, spreading or reflexed when fully expanded. Stamens 6, inserted at base of the lobes, the anthers dorsifixed, versatile, introrse. Ovary superior, 3-locular, with a single or many ovules per locule; style slender, terminated by a 3-lobed or capitate stigma. Fruit a fleshy berry or sometimes hard and woody, usually red or orange; seeds 1-3, bony, globose or elongate. A Family here construed as having 3 genera and ca. 225 species occurring primarily in the Old World tropics, subtropics, and islands of the Pacific Ocean. Representatives of all three genera have been introduced into Puerto Rico and the Virgin Islands and some of these have escaped and become more or less naturalized. Contrary to the treatment of Dahlgren et al. (1985), *Cordyline* is here placed in the Dracaenaceae. This was done primarily for reasons of convenience but also because *Cordyline* does not fit well into the small, heterogeneous taxon Asteliaceae.

TYPE: *Dracaena* L.

Key to the genera

1. Herbaceous plants with creeping rhizomes and rather few, leathery-succulent leaves, these upright or in a spreading, sessile rosette; inflorescence of racemes ..... 3. *Sansevieria*
1. Shrubby plants with woody, simple or branched, upright stems bearing terminal clusters of thin or membranous leaves; inflorescence of panicles. 2
   2. Leaves petiolate, flowers scattered separately on panicle branches; ovules 4-12 per locule..... 1. *Cordyline*
   2. Leaves sessile; flowers in dense, umbel-like clusters; ovules 1 per locule ..... 2. *Dracaena*

1. CORDYLINE

Cordyline Comm. ex R. Br., Prodr. 280 1810 , *nom. conserv.*

Erect shrubs with woody stems, often stoloniferous at base. Leaves crowded near stem apex, petiolate or subsessile. Inflorescence paniculate, with small, scarious bracts; flowers short-pedicellate or subsessile, the perianth tubular or narrowly campanulate, the tube short, the lobes oblong, erect or spreading; stamens 6, inserted at base of perianth-lobes, the filaments filiform or flattened; ovary sessile, 3-locular, with 4-12 ovules per locule; style filiform, the stigma capitate or 3-lobed. Fruit a globose, fleshy, 3-locular, indehiscent berry; seeds numerous, flattened, black and lustrous. A genus of 20 species widely distributed in tropical and warm temperate regions, including Indomalaysia, Polynesia, New Zealand, Australia, Africa, and Brazil. A single introduced species occurs in Puerto Rico.

TYPE: *Cordyline cannifolia R. Br., typ. conserv.*

1. Cordyline fruticosa (L.) A. Chev., Jard. Bot. Saigon 66. 1919; *Convallaria fruticosa* L., Herb. Amb. 16. 1754; *Taetsia fruticosa* (L.) Merr., Interpr. Herb. Amboin. 137. 1917; *Asparagus terminalis* L., Sp. Pl. ed. 2, 450. 1762, non. Illeg.; *Dracaena terminalis* L., Syst. Nat. ed. 12, 246. 1767, non. Illeg.; *Cordyline terminalis* Kunth, Abh. Königl. Acad. Wiss. Berlin 30. 1820, nom. illeg. Holotype*: Rumphius, Herb. Amboin. 4: t. 34. 1743.*

Slender unbranched or few-branched shrub 1-3 m tall, ringed with scars from fallen leaves. Leaves clustered at the apex of stems; petioles 15-30 cm long; blades elliptic to linear-lanceolate, 30-70 × 10-15 cm, the apex acute to attenuate, the base cuneate, the tissue green to deep purple or red or often green with red margins. Panicles terminal, densely-flowered; perianth white, purple, or red, 10-12 mm long, the lobes linear-oblong. Berries red or purple.

General distribution: Native of Malaya, but very widely planted in tropical countries. In addition to its ornamental qualities, the red-leaved forms are often planted as boundary markers or in hedgerows, where they tend to persist and become naturalized.

Distribution in Puerto Rico and the Virgin Islands: Cultivated in both, Puerto Rico and the Virgin Islands. Recorded from Arecibo (Río Abajo State Forest) and San Juan.

Common name: Puerto Rico: *Bayoneta.*

Selected specimens examined: PUERTO RICO: San Juan: Río Piedras, *Stevenson 5911* (US).

2. DRACAENA

Dracaena L., Syst. Nat. ed. 12, 229, 246. 1767.

Trees or shrubs with erect woody stems sometimes enlarging to form thick trunks. Leaves entire, leathery, closely parallel-veined but with numerous minute cross-veins, crowded along branches or clustered at the ends of branches. Inflorescence paniculate; flowers closely aggregated in pseudo-umbels at nodes on the branches of the panicle, accompanied by small, scarious bracts; perianth funnelform with a short tube and narrow subequal lobes. Stamens 6, borne in the perianth-tube at base of lobes, with terete or flattened filaments, Ovary sessile, 3-locular; style filiform with a capitate stigma. Fruit berry-like, usually 1-seeded. Mostly an Old World genus of about 150 (Howard, 1979) or 80 (Dahlgren et al. 1985) species distributed from Micronesia and subtropical Africa through Asia to northern Australia. A disjunct native species grows in eastern Cuba, and another in Central America. A single species has been introduced into Puerto Rico; this is commonly cultivated for ornament and sometimes persists or becomes naturalized.

LECTOTYPE: *Dracaena draco* (L.) L. (≡ *Asparagus draco* L.), designated by Rafinesque, Fl. Tellur. 4: 17. 1838.

1. Dracaena fragrans (L.) Ker Gawl., Bot. Mag. 27: t. 1081. 1808; *Aletris fragrans* L., Sp. Pl. ed. 2, 456. 1762; *Pleomele fragrans* (L.) Salisb., Prodr. Stirp. Chap. Allerton 245. 1796. Lectotype: Africa. J. Commelijn, *Horti med. amstelod. 2: 7, t.4., f.2, 1701*, designated by Wijnands, Bot. Commelins 1: 130. 1983.

Shrub becoming arborescent to 15 m tall, the older woody stems to 30 cm or more in diam., the younger stems conspicuously ringed with leaf scars. Leaves narrowly elliptic-oblanceolate, usually widest above the middle, (12-) 20-125 (-150) × (1-) 2-12 cm, rounded or acute at the apex with a subulate mucron, narrowly cuneate or narrowed slightly to long-decurrent at the base, bright green and often variegated above, paler green beneath. Inflorescence a terminal panicle with few, widely divaricate branches, (15-) 20-100 (-160) cm long, the main axis often zigzag; bracts deciduous, concave, long-cuspidate; flowers arranged in pedunculate or sessile glomerules of 10 or more flowers, each subtended by a triangular whitish scarious bract, (15-) 17-22 (-25) mm long, yellowish or white, often with a pink stripe, intensely fragrant; perianth-lobes (7) 9-12 × 2-3 mm; stamens inserted at the throat with inflated filaments, the anthers 2-2.5 mm long; ovary cylindrical to bottle-shaped; style terete, the stigma 3-lobed. Fruit red-orange, spherical to depressed-globose, 13-20 mm in diam.; seeds rounded-rectangular, 6-14 × 5-9 mm. A description by *Bos et al.*, 1992, Edinb. J. Bot. 49: 319, was used in preparing this description.

General distribution: Native of Africa; widely cultivated in the Neotropics.

Distribution in Puerto Rico: A species is propagated by lopping off the upper part of the stems and planting these canes in the ground, where they soon produce roots; meanwhile the old cane-bases sprout new branches. Recorded from Adjuntas, Aibonito, Arecibo, Lares, Río Grande, and Utuado, in roadside thickets at elevations of 200-600 m.

Common names: Puerto Rico: *Drecina, Cocomacaco, and Dracena.*

Note: The name *Aloe fragrantissima* Jacq. applies to this taxon, and has priority by three months over the name *Aletris fragrans* L. (*Dracaena fragrans* (L.) Ker Gawl.). Given that the Jacquin's name has hardly been in use, it would be appropriate to propose *Aletris fragrans* L. for conservation. The authors are using the Linnean name in anticipation of such conservation.

Selected specimens examined: PUERTO RICO: Adjuntas: Bo. Limaní, S off Rt. 525, on farm of Estación Agricola, *Axelrod et al. 11365* (UPRRP). Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10758* (US).

Cultivated Species

Dracaena draco (L.) L., of the Canary Islands, was cultivated at the St. Croix Agricultural Experiment Station (Britton & P. Wilson, 1923). *Dracaena goldieana* Bullen ex Mast. & T. Moore and *D. surculosa* Lindl. were cited by Martorell et al. (1981) as cultivated in Puerto Rico.

3. SANSEVIERIA

Sansevieria Thunb., Prodr. Pl. Cap. [xii] 65. 1794, *nom. conserv.*

Acaulescent or short-stemmed non-woody plants with creeping rhizomes. Leaves usually rather few, often in a rosette, fleshy or coriaceous, terete or flat, spreading or rigid and erect, often variegated. Inflorescence terminal, pedunculate, racemose; pedicels articulated, solitary or fascicled. Perianth tubular at base, the lobes spreading or recurved, cream-white or greenish white. Stamens 6, exserted, the filaments filiform; anthers oblong, bifid at base, 2-lobed at apex ; style long and slender or filiform, about equaling the stamens, the stigma capitate. Fruit a 1- to 3-seeded berry, globose to oblong-ellipsoid, with thin membranous pericarp; seeds globose with a fleshy testa. A genus of 60 species found in tropical and southern Africa, Madagascar, and Arabia; also, many hybrids and horticultural variants exist. The classification of these plants is often very difficult.

TYPE: *Sansevieria hyacinthoides* (L.) Druce (≡ *Aloe hyacinthoides* L.), *typ. conserv.*

References: Brown, N.E. 1915. *Sansevieria.* Kew Bull. 1915. 185-261. Wijnands, D.O. 1973. Typification and nomenclature of two species of *Sansevieria* (Agavaceae). Taxon 22: 158-159.

Key to the species of *Sansevieria*

1. Leaves cylindrical ..... 1. *S. cylindrica*
1. Leaves flat or half-cylindrical. 2
2. Leaves half-cylindrical (concave on one side)..... 3. *S. pearsonii*
2. Leaves flat. 3
3. Margins of leaves with a reddish line ..... 2. *S. hyacinthoides*
3. Margins of leaves green or white, lacking a reddish line ..... 4. *S. trifasciata*

1. Sansevieria cylindrica Bojer ex Hook., Bot. Mag. 85: t. 5093. 1859; *Cordyline cylindrica* (Bojer ex Hook.) Britton in Britton & Wilson, Bot. Porto Rico 5: 150. 1923. Type: Mauritius. *Bot. Mag. 85: t. 5093. 1859.*

Acaulescent plants with stout rhizomes. Leaves 3 or 4 together, 2-ranked, stiffly erect, 35-100 cm tall or more, cylindrical or slightly compressed, mostly 1-2 cm thick, tapering upward gradually to a sharp, rigid point. Inflorescence to 1 m tall; flowers 5 or 6 in a cluster, the perianth white or tinted slightly pink, the lobes 2-3 cm long, linear, revolute at anthesis. Ripe fruits globose, 7-8 mm diam, orange.

General distribution: Originally endemic to Mauritius, now cultivated in most warm countries, often persisting or becoming naturalized.

Distribution in Puerto Rico and the Virgin Islands: No voucher specimens seen from Puerto Rico; sight record from Guánica; also seen in St. Croix and recorded by Britton & P. Wilson (1923) as having been planted in St. Thomas.

Common name: Puerto Rico: *Sansiviera redonda.*

Selected specimens examined: St. Croix: Eliza's Retreat road, SE of Christiansted, along road, *Proctor & O'Reilly 45235* (US).

2. Sansevieria hyacinthoides (L.) Druce, Bot. Exch. Club Soc. Brit. Isles 3: 423. 1914; *Aloe hyacinthoides* ß *guineensis* L., Sp. Pl. 321. 1753; *Sansevieria guineensis* (L.) Willd., Sp. Pl. 2: 159. 1799; *Cordyline guineensis* (L.) Britton, Brooklyn Bot. Gard. Mem;. 1: 35. 1918; *Sansevieria thyrsiflora* Petagna, Inst. Bot. 3: 643. 1787, *nom. illeg.* ; *Sansevieria thyrsiflora* Thunb., Prodr. Fl. Cap. 65. 1794, *nom. illeg.* Lectotype: C. Commelijn, *Praeludia Bot. t. 33. 1703*, designated by Stearn, Cat. Bot. Books Miller Hunt liii. 1961. *Sansevieria metallica* Gérôme & Labroy, Bull. Mus. Hist. Nat. (Paris) 9: 170, 173, fig. 2. 1903.

Figs. 30. A-C; 62. E

Acaulescent plants with stout creeping rhizomes. Leaves 2-4 together in a tight cluster, stiffly erect, lanceolate or narrowly elliptic, 30-100 × 3-9 cm, the apex acute or obtuse, the tissue leathery and dull green but mottled transversely with numerous more or less obscure pale green bands, the margins with a fine reddish line. Inflorescence pedunculate, 30-70 cm long, bracteate; pedicels to 5 mm long or more; flowers with narrow revolute greenish white perianth-lobes to 1.5 cm long. Fruits globose, short-stipitate, red-orange, 8 mm diam.; seeds 7-8 mm diam.

General distribution: Native of South Africa, now very widely cultivated, commonly persisting and becoming naturalized, weedy, or rampant.

Distribution in Puerto Rico and the Virgin Islands: Recorded from Arecibo, Barranquitas, Ciales, Fajardo, Guánica, Guayanilla, Mayagüez, Rincón, San Juan, and Vieques; undoubtedly occurs unrecorded in many other municipalities; St. Croix, St. Thomas, and St. John, probably also in Tortola. This species has several horticultural varieties.

Common names: Puerto Rico: *Cocuisa, Chucho, Lengua de chucho, Lengua de vaca.*

Note: This species was incorrectly treated in *Flora of St. John*, U.S. Virgin Islands (Acevedo-Rdgz., 1996) as *Sansevieria trifasciata* a species not found there.

Selected specimens examined: Puerto Rico: Ciales: Camino de la Ceiba, towards Quebrada del Pozo Azul, *Acevedo-Rdgz. & Vicens 11895* (US). Fajardo: "Seven Seas" beach, edge of coastal scrub, *Acevedo-Rdgz. et al. 14455* (US). Guayanilla: Bo. Boca: Punta Verraco, *Proctor & Haneke 44523* (US). Mayagüez: *Landreau s.n.*

(US). San Juan: *Underwood & Griggs 917* (US). St. Croix: Bassin, *Ricksecker 341* (US). Salt River near Morningstar, *Fosberg 54061* (US). St. John: Reef Bay Quarter, Bordeaux Mountain, *Acevedo-Rdgz. & Siaca 3859* (US); Coral Bay Quarter, along Bordeaux Road, *Acevedo-Rdgz. et al. 5129* (US).

3. Sansevieria cf. **pearsonii** N. E. Br., Bull. Misc. Inform. Kew 1911: 97. 1911. Type: Angola. *Pearson 2073* (K).

Acaulescent, with a stout creeping rhizome. Adult leaves 3-5 to a growth, stiff, erect but slightly divergent, the longest to 75 cm long or more, 1.5-3 cm thick, cylindrical but with a concave channel on the inner face from the base nearly to the apex, tapering gradually to the attenuate, sharp-pointed tip, the outer surface smooth except for a few fine longitudinal grooves, bright to dark green with faint lighter horizontal bands. Flowers not described. Inflorescence ca. 60 cm long. Fruits globose, orange, 7-9 mm diam.

General distribution: Native to Angola.

Distribution in the Virgin Islands: Known only along the Eliza's Retreat road in St. Croix, where it is abundantly naturalized in roadside thickets.

Note: The identity of our St. Croix plants may be subject to correction.

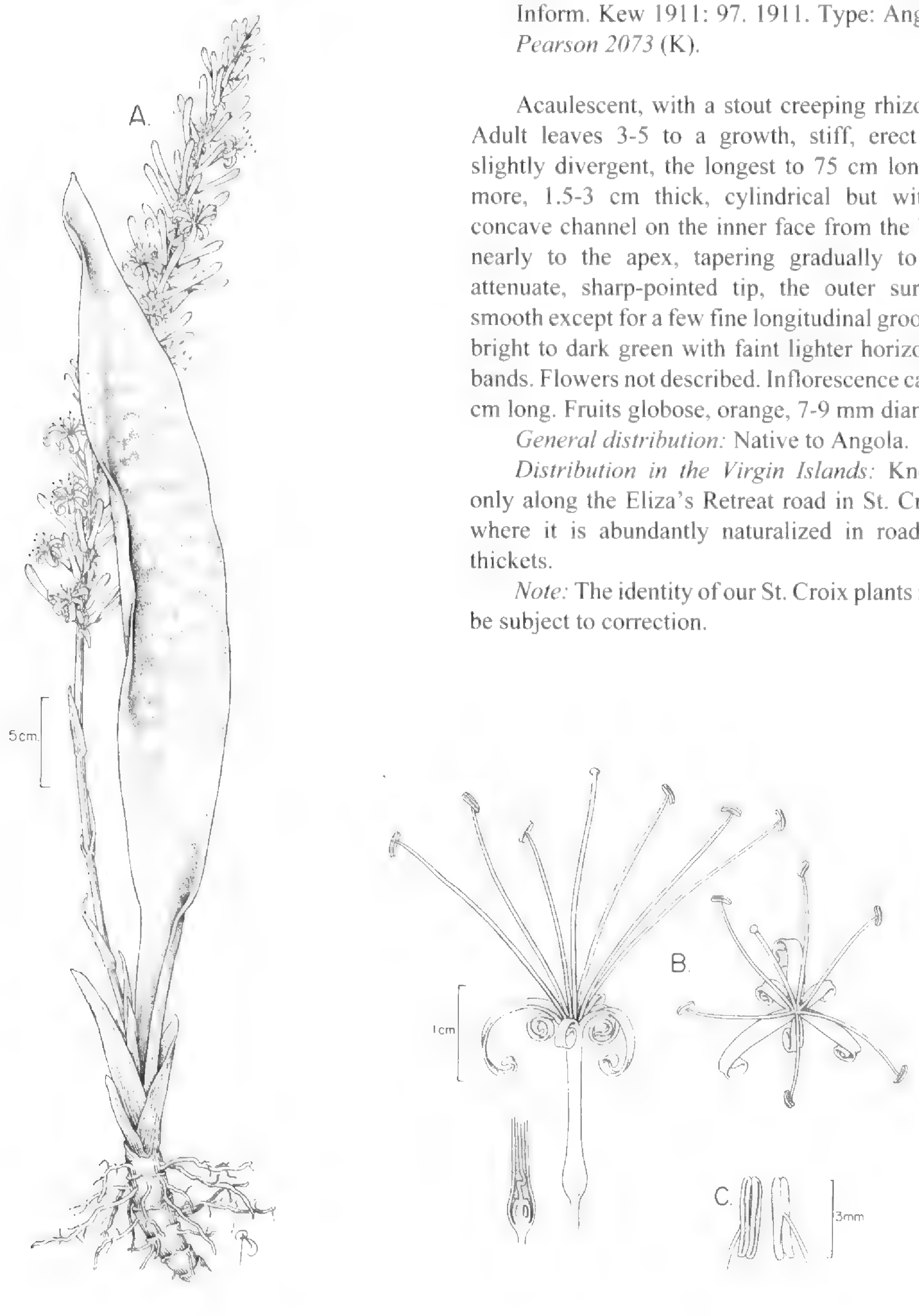


Fig. 30. A-C. *Sansevieria hyacinthoides*. **A.** Habit. **B.** Flower, lateral view, l.s. basal portion showing pistil, and top view. **C.** Anther, frontal and dorsal views. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

4. Sansevieria trifasciata Prain, Bengal Pl. 2: 1054. 1903. Type: India. a cultivated plant, Unknown.

Acaulescent plants with stout creeping rhizomes. Leaves 1 or 2 together, linear-oblanceolate, stiffly erect, 30-100 × 3 cm, the apex tapering to a stiff green point, the blades transversely banded with contrasting green and whitish zones, the margins green. Inflorescence pedunculate, 30-75 cm long. Flowers solitary or in clusters of 2 or 3, bracteate, pedicels to 5 mm long; perianth tube 1 cm long or less, the linear lobes to 2 cm long, white or greenish white. Fruits subglobose to oblong-ellipsoid, 7-9 × 5-8 mm, bright orange.

General distribution: Native of Africa; widely cultivated and often persisting, but less common than *S. hyacinthoides*.

Distribution in Puerto Rico and the Virgin Islands: Recorded from Ceiba, Dorado, San Juan, and Vieques; in the Virgin Islands there are no authentic records of naturalized populations, but it occurs in cultivation in St. Croix and St. Thomas.

Note: This species has sometimes been confused with *S. hyacinthoides*, which it resembles except for its slightly narrower, more brightly green-and-whitish leaves lacking a fine reddish line along the margins. According to Howard (1979), Jacquin, *Hort. Vind, t. 308. 1762* is a good representation of this species.

Selected specimens examined: PUERTO RICO: San Juan: Río Piedras, *Stevenson 2994* (US). Vieques: Las Marias, *Shafer 2705* (US).

Family 18. **ASPHODELACEAE** *Aloe Family*

Asphodelaceae Juss., Gen. Pl. 51. 1789.

by G. R. Proctor

Perennial often succulent or leathery herbs with rhizomatous roots, or sometimes trees with woody trunks. Leaves primarily basal, spirally arranged or sometimes 2-ranked, sheathing at base. Leaves more or less fleshy, often internally gelatinous, flat or cylindrical, subulate to linear-lanceolate or elliptic, the apex often spine-tipped, the margins smooth, toothed or serrate. Inflorescence terminal or axillary, of simple or branched spikes or racemes; scapes leafless or beset with small bracteal leaves. Flowers bisexual with 6 perianth segments. Stamens 6, with free filaments, the anthers dorsifixed, introrse, longitudinally dehiscent. Ovary 3-locular, with 2 to many ovules in each locule, the placentation axile; style simple, with small stigma. Fruit a loculicidal capsule; seeds ovoid or elongate, usually with an aril. A family of about 17 genera and 814 species, widely distributed in tropical and subtropical regions of the Old World, especially common in Africa. In older classifications these plants were considered part of the Liliaceae. A single genus, *Aloe*, has been introduced into Puerto Rico and the Virgin Islands.

TYPE: *Asphodelus* L.

1. ALOE

Aloe L., Sp. Pl. 319. 1753.

Succulent herbs with basal leaves, or else with a woody caudex more or less well-developed (a few species become large branching trees). Leaves in a rosette or rarely distichous, fleshy, with toothed margins, containing bitter sap which turns black on exposure or drying. Inflorescence axillary, racemose or paniculate, from a naked scapose base; flowers usually nodding; perianth a cylindrical tube, the lobes coherent except at the spreading or recurved tips, often brightly colored. Ovary sessile, ovoid to oblong, usually 3-angled, the style filiform with a small capitate stigma. Fruit a coriaceous, dehiscent capsule; seeds numerous, flattened, black. A large genus of approximately 330 species, the majority occurring in

tropical and southern Africa and Madagascar. Many species are cultivated as ornamentals; a single one has escaped and become naturalized in the West Indies, including Puerto Rico and the Virgin Islands.

Lectotype: *Aloe perfoliata* L., designated by Britton & Millspaugh, Bahamas Fl. 69. 1920.

1. Aloe vera (L.) Burm. f., Fl. Indica 83. 1768; *Aloe perfoliata* var. *vera* L., Sp. Pl. 320. 1753. Lectotype: Rheede, *Hort. Malab. 11: t.3,* 1692, designated by Wijnands, Bot. Commelins 127. 1983.

Aloe barbadensis Mill., Gard. Dict. ed. 8, Aloe no 2. 1768; *Aloe vulgaris* Lam., Encycl. 1: 86. 1783, *nom. illeg* . Type: Unknown, said to be from the "American Islands" [West Indies].

Figs. 31. A-D; 62. F

Acaulescent or with a very short, erect, woody caudex spreading by stolons to form large colonies. Leaves ascending to erect, in a rosette, sessile, narrowly deltate, 30-50 × 5-6 cm, long-acuminate at the apex, the margins with remote teeth, the tissue glaucous, light green. Inflorescence a dense raceme, scapose at base; flowers yellow, with very short pedicels; perianth to 2.5 cm long, equaled or slightly exceeded by the stamens; style exserted. Fruits apparently not described, seldom produced.

General distribution: Thought to be native to the Mediterranean region, but now widely cultivated and extensively naturalized. This species has important medicinal and cosmetic properties.

Distribution in Puerto Rico and the Virgin Islands: Widely cultivated and naturalized; recorded from Guánica, Mona Island, Salinas, and

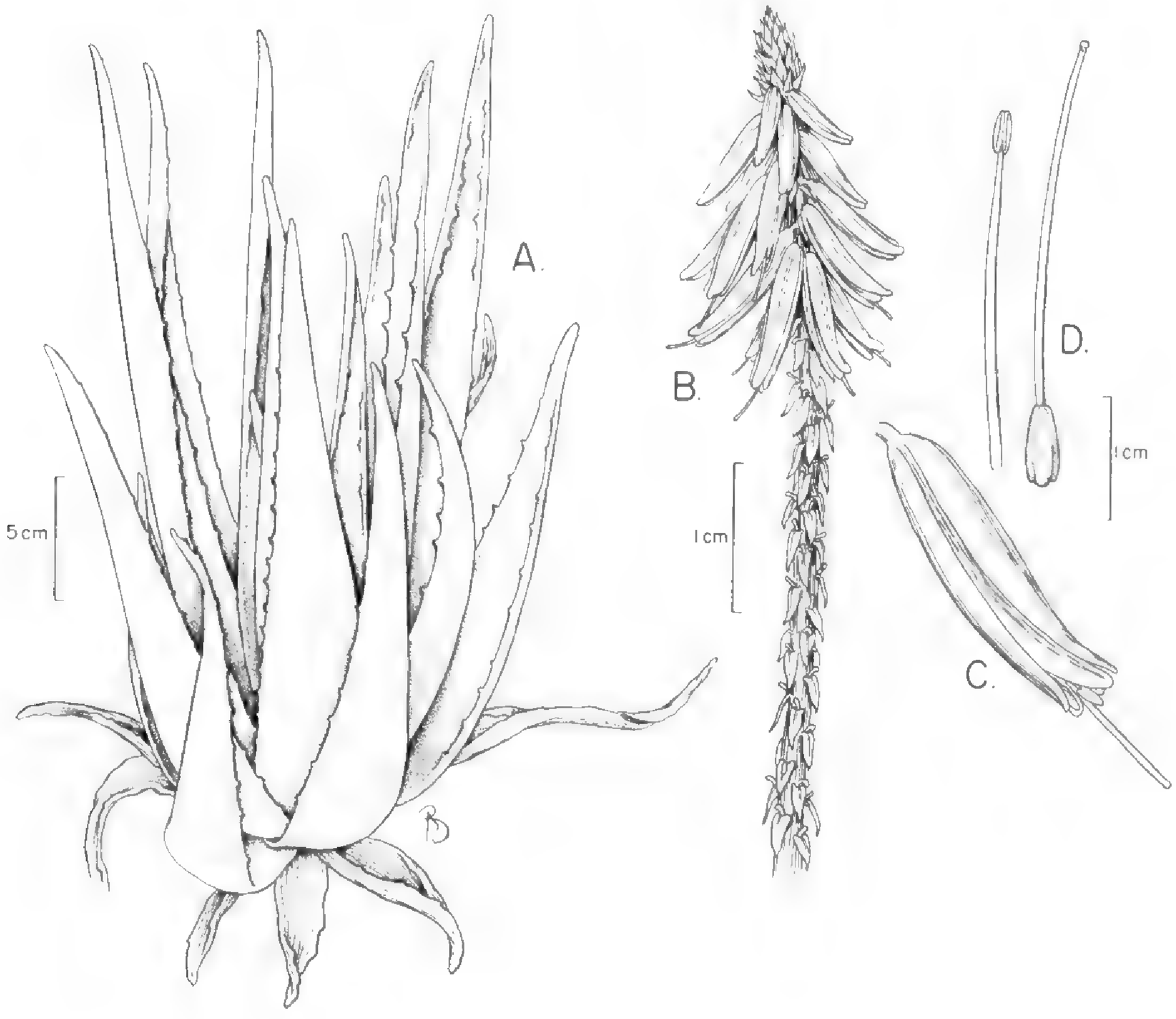


Fig. 31. A-D. *Aloe vera.* **A.** Habit. **B.** Inflorescence. **C.** Flower. **D.** Stamen and pistil. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

Vieques; it undoubtedly grows in many more sites, especially in the dry southern districts; St. Croix, St. Thomas, St. John, Tortola, and Virgin Gorda.

Common names: Puerto Rico: *Sábila, Zábila;* Virgin Islands: *Aloe.*

Note: The type of *Aloe vera* pertains to the original publication by Rheede, since the facsimile edition has instead a wrong illustration. The illustration presented there is a duplicate of t. 35, where the number 5 has faded off of the plate number 35.

Selected specimens examined: Puerto Rico: Salinas: Ensenada, *Liogier & Martorell 31602* (US). Vieques: Brigadier Point to Puerto Negro, *Shafer 2922* (US). St. Croix: South Shore, *Ricksecker 309* (US). St. John: East End Quarter; Center Line Road, *Acevedo-Rdgz. & Siaca 4223* (MO, NY, UPR, US). St. Thomas: *Morrow 131* (US).

Cultivated Species

The below listed taxa of *Aloe*, mostly from southern Africa, were listed by Britton & P. Wilson (1923) as cultivated on St. Thomas: *Aloe arborescens* Mill., *A. ciliaris* Haw., *A. ferox* Mill., *A. grandidentata* Salm-Dyck, *A. greenii* Baker, and *A. obscura* Mill.

CULTIVATED GENERA

Haworthia tessellata Haw., from Africa, was cultivated in St. Thomas at Louisenhoj (Britton & P. Wilson, 1923).

Family 19. **ARECACEAE (PALMAE)** *Palm Family*

Arecaceae Schultz, Nat. Syst. Pflanzenr. 317. 1832; *nom alt.* Palmae Juss., Gen. Pl. 37. 1789, *nom. conserv.*

by G. R. Proctor

Trees, shrubs, or vines with thick or fine fibrous roots, perennial or sometimes monocarpic. Stems slender to massive, solitary, clumped, or stoloniferous, rarely branched, ringed with leaf-scars and smooth internodes, or rough with persistent petiole-bases or sometimes beset with long sharp spines. Leaves spirally arranged, with sheathing, tubular, armed, or unarmed, deciduous or persistent petioles; blades simple and linear-lanceolate, or pinnately or rarely bipinnately compound, or palmately or costal palmately divided; leaflets and segments linear-elliptic, falcate, or fan-shaped, the tissue glabrous, scaly, hairy, prickly, or waxy at least during development; stipules absent, but petiolar sheath sometimes prolonged as a ligule at base of blade. Flowers 3-merous, usually actinomorphic and small, unisexual (plant monoecious, dioecious, or polygamous), or less often bisexual, in axillary (or less often terminal) spikes, racemes, or panicles, the inflorescences subtended by a prophyll or spathe, in position infra-, inter- or suprapetiolar, and sessile or pedunculate. Individual flowers sessile or pedicellate, solitary or clustered in triads of 2 staminate on either side of 1 pistillate flower. Perianth tepals biseriate (or in *Thrinax* and allies, a single usually irregularly 6-lobed series), persistent in fruit. Stamens 3 to 200 or more; filaments free, connate, or epipetalous; anthers 2- (rarely 1-) locular, opening by a longitudinal slit. Ovary superior, of 3 (or rarely more), 1-ovulate carpels (1-carpellate in *Thrinax* and allies); carpels free or variously united: styles free or fused, or stigmas sessile. Fruits small to very large, 1- to 3-seeded (seeds rarely more), dry and fibrous or berry-like with smooth, scaly, prickly, hairy, or warty exocarp, fibrous or fleshy mesocarp, and papery to bony endocarp. Seeds with solid, hollow, perforated, homogeneous or ruminate endosperm, and a subapical, lateral, or basal, embryo. A large, diverse, economically important family of 212 genera and more than 2600 species, distributed worldwide in tropical and subtropical regions, also a few extending into warm-temperate areas. The flora area has 11 genera, each genus represented by a single

species. This does not take into account numerous species from many parts of the world, introduced primarily for ornament. Apparently none of these has escaped or become naturalized, and therefore inclusion in this book would not be appropriate. They deserve a separated illustrated publication.

TYPE: *Areca* L.

References: Cook, O. F. 1901. A synopsis of the palms of Puerto Rico. Bull. Torrey Bot. Club 28: 525-560. Moore, H. E. & J. Dransfield. 1979. The typification of Linnean Palms. Taxon 28: 59-70. Read, R. W. 1979. Palmae. 320-368. *In*: R. A. Howard (ed.), Fl. Lesser Antill. 3: 320-388. Uhl, N. W. & J. Dransfield. 1987. Genera Palmarum. Allen Press, Lawrence, Kansas.

Key to the genera

1. Leaves palmate (with or without a central rib). 2
   2. Leaves costa-palmate, the mid rib continuous with the petiole, extending through the length of the blade and strongly recurved; inflorescence very large and much branched ..... 10. *Sabal*
   2. Leaves palmate, without a prominent mid rib (a short hastula present); inflorescence slender, erect or arching, with short secondary branches 3
      3. Leaf sheath split below the insertion of the petiole; ripe fruits white; seeds smooth, semi-perforated on one side ..... 11. *Thrinax*
      3. Leaf-sheath not split below the insertion of the petiole, the tubular portion net-like and persistent; ripe fruits black or purple-black; seeds with grooved surface, separating into several divisions when dry ..... 4. *Coccothrinax*
1. Leaves pinnate. 4
   4. Spines present on leaves, petioles, spathes, or trunk, or on all of these. 5
      5. Leaf-segments with apices broad and erose; ripe fruits red or scarlet ..... 2. *Aiphanes*
      5. Leaf-segments with apices narrow and sharply pointed, or sometimes bifid; ripe fruits yellowish green or pale orange, not red or scarlet ..... 1. *Acrocomia*
   4. Spines absent, plants unarmed. 6
      6. Crownshaft present; inflorescences infrapetiolar, attached at base of crownshaft. 7
         7. Crownshaft split opposite the petioles; mature trunks usually less than 20 cm in diam.; primary bracts not filled with loose scales: seedling leaves bifid ..... 7. *Prestoea*
         7. Crownshaft not split; mature trunks more than 40 cm in diam.; primary bracts filled with loose scales when young; seedling leaves lanceolate, not bifid ..... 9. *Roystonea*
      6. Crownshaft absent; inflorescences interpetiolar. 8
         8. Leaf-segments with several prominent longitudinal nerves; flowers sunk in pits; petals united, falling like a cap ..... 3. *Calyptronoma*
         8. Leaf-segments with a single prominent longitudinal nerve; flowers not sunk in pits; petals free, not forming a cap. 9
            9. Trunk smooth, with very faint annular rings, strongly tapering from a swollen base to a slender apex 5-9 cm in diam.; leaves less than 1.8 m long ..... 6. *Gaussia*
            9. Trunk ringed with more or less conspicuous annular leaf-scars, and more than 15 cm in diam. at apex; leaves more than 2 m long. 10
               10. Small trees with straight trunks not more than 8 m tall; leaves 1.5-3 m long; flowers all alike, bisexual; ripe fruits red, up to 1.7 cm in diam. ..... 8. *Pseudophoenix*
               10. Tree up to 30 m tall, the trunk often curved or bent; leaves 3-6 m long; flowers unisexual, the inflorescences monoecious, fruits more than 20 cm long ..... 5. *Cocos*

1. ACROCOMIA

Acrocomia Mart., Hist. Nat. Palm. 2: 66. 1824.

Large solitary monoecious palms armed with sharp spines; trunk columnar, often variously swollen, fusiform or ventricose; usually heavily armed at first with annular rows of spines, these commonly deciduous with age. Leaves pinnate; sheaths spiny; petioles very short, hardly evident; rachis armed with large flat spines; segments numerous, narrowly lanceolate, acuminate or bifid, inserted singly or in clusters in more than one plane except toward apex of leaf, the segments spreading or arching at different angles, usually glabrous and glossy green on upper side, often glaucous-green and pubescent or pilose on the under side. Inflorescences paniculate, interpetiolar, once-branched, the peduncle stout, arching, usually densely scaly, and spiny, the first and second nodes with large and very unequal primary bracts, the first bract much shorter than the second, quickly withering, the second bract woody and scurfy or brown-tomentose, variously armed, crooked basally, and pitted toward the apex. Flowers unisexual; staminate flowers much smaller than the pistillate, inserted in pits and mostly crowded on the apical half of the inflorescence branches, the much larger and fewer pistillate flowers produced only along the flexuous basal portion of the same branch, sometimes accompanied by solitary staminate flowers or these close on either side of a pistillate flower, forming a triad. Sepals of staminate flowers free, much shorter than the petals; petals connate basally, valvate apically; stamens 6, filaments slender, inflexed in bud, basally adnate to the petals; pistillode prominent, tufted. Pistillate flowers with free, imbricate sepals; petals free, imbricate except toward apex; staminodes represented by a broad, minutely denticulate cupule; ovary 3-pistillate, variously scaly or pubescent; stigmas sessile, recurved, the stigmatic remains apical and conspicuous on fruit. Fruits depressed-globose, 1-seeded, olive-green or yellowish; exocarp chartaceous; mesocarp fibrous and mucilaginous; endocarp bony, 3-porate; endosperm homogeneous, oily, edible. A widespread Neotropical genus with ca. 30 taxa. However, Henderson (1994: The Palms of the Amazon, Oxford University Press, New York) lumped all the recognized taxa into just two species, *A. aculeata* (Jacq.) Lodd. and *A. hassleri* (Barbosa Rodrigues) W. J. Hahn. Puerto Rico has a single species, here considered endemic.

TYPE: *Acrocomia aculeata* (Jacq.) Lodd. (≡ Cocos aculeata Jacq.) .

1. Acrocomia media O. F. Cook, Bull. Torrey Bot. Club 28: 566. 1901. Type: Puerto Rico; Ponce. *Cook s. n.* (US).

Acrocomia sclerocarpa sensu Bello, Anales Soc. Esp. Hist. Nat. 12: 114. 1883, non Martius, 1824.

Acrocomia aculeata sensu Britton & P. Wilson, Bot. Porto Rico 5: 115. 1923, non *Cocos aculeata* Jacquin, 1763.

Stout solitary palm, the trunk cylindrical or slightly fusiform, becoming 8-10(15) m tall, 20-30 cm in diam., densely armed with internodal rings of long black spines, these eventually falling, leaving a naked gray trunk smooth except for leaf scars. Leaves numerous, the short petioles densely spiny the blades 3-4 m long with 45-60 multifarious linear segments, the longer ones 55-70 × 0.6-2 cm, acuminate or attenuate at apex. Inner spathe (second primary bract) up to 60 cm long; densely brown-pubescent and somewhat spiny on outer surface, fusiform at first, becoming hood-shaped after opening. Panicles up to 1.5 m long, with short thick densely spiny peduncles and numerous slender branches 10-25 cm long, the upper ones wholly staminate, the lower ones staminate on apical two-thirds, the basal flexuous portion bearing 3-5 distant pistillate flowers. Staminate flowers densely borne in individual pits in the rhachilla, each flower ca. 8 mm long, pale yellow at anthesis; pistillate flowers sub-globose, ca. 10 mm long. Fruits depressed-globose, 3.5-4.5 cm in diam., smooth, dull yellowish at maturity.

General distribution: Endemic to Puerto Rico and the Virgin Islands.

Distribution in Puerto Rico and the Virgin Islands: Occurs in moderately dry to moist habitats at mostly elevations below 200 m. Often transplanted as a street-side ornamental. Recorded from Bayamón, Carolina, Humacao, Manatí, Peñuelas, Ponce, Sabana Grande, Salinas, San Juan, Toa Baja, Utuado, and Vega Baja; St. Croix and St. Thomas. Probably distributed more widely than records indicate.

Common names: Puerto Rico: *Coroso, Palma de coroso.*

Note: *Acrocomia media* was treated as a synonym of *A. aculeata* by Britton & P. Wilson (1923). Unfortunately, there is no recent monograph of the genus except Bailey's preliminary treatment of 1941, so the relationships among the Greater and Lesser Antilles populations cannot be clearly assessed. *Acrocomia media* is probably closest morphologically as well as geographically to *A. aculeata* of the Lesser Antilles; according to available information it differs from the latter species in its longer leaves with narrower segments, its much shorter spathes, and in its slightly larger flowers. Other differences, such as the length of spines and character of indument, also exist. It should be noted that these comparisons are based on measurements of very few specimens, so that currently the limits of variation are unknown. It is an unfortunate fact that large, spiny palms do not invite close examination.

Selected specimens examined: PUERTO RICO: Bayamón: Mogotes near Bayamón, *Read 2061* (US-4). Manatí: Bo. Tierras Nuevas Saliente, *Proctor & Thomas 42235a* (US). Peñuelas: between Peñuelas and Tallaboa Alta, *Sintenis 4935* (US). Sabana Grande: *Sintenis 3972* (US). San Juan: Río Piedras, *Stevenson 5616* (US). Utuado: *Sintenis 6483* (US). ST. THOMAS: St. Peter, *E.G. Britton & Marble 1210* (US).

2. AIPHANES

Aiphanes Willd., Samml. Deutch. Abh. Königl. Akad. Wiss. Berlin 1803: 250. 1806.

Small to medium, solitary monoecious understory palms; trunks with internodal spines, these eventually deciduous. Leaves pinnate, the sheaths soon splitting into shreds, usually densely spiny; petiole also usually densely spiny; rachis convex beneath, ridged on upper side, often variously armed with spines, glabrescent to densely matted-lepidote; segments numerous, in 1 or 2 planes, usually broadest toward outer end, the apices erose-truncate, dark green, armed or not on mature plants, but usually densely prickly on one or both sides of leaves on juvenile plants. Inflorescences interpetiolar, usually once-branched; peduncles usually densely armed with long black spines, elongate, arching or pendent, the first and second nodes producing strongly unequal primary bracts, the first bract relatively smaller and unarmed, the second bract narrow and often densely spiny; rachis often spiny toward base and more or less lepidote with tiny appressed scales; branches sinuous, spreading. Flowers usually in triads of one pistillate and two staminate, the entire triad often sunk in a depression on the branch; paired or solitary staminate flowers may also occur; flower clusters usually subtended by 2 or 3 minute bracts in addition to the pit bract. Staminate flowers often stipitate, usually also pedicellate; sepals connate at base; petals mostly free and valvate; stamens 6, filaments straight, adnate to the petals basally; anthers versatile, sagittate basally, retuse at apex; pistillode conical to globular and trifid. Pistillate flowers sessile with free, basally imbricate sepals; petals about half-connate; staminodial cup usually adnate to the petals; ovary globose to pyriform, 3-pistillate; stigmas very short; stigmas 3. Fruit globose, 1-seeded, red or scarlet at maturity; mesocarp yellow; endocarp bony, variously sculptured, with 3 pores usually equatorial in position. Seeds irregular in form, the embryo opposite one of the endocarp pores; endosperm homogeneous. Seedling leaves more or less bifid, conspicuously spiny. A Neotropical genus of about 30 species (Read, 1979) or 22 species (Borchsenius & Bernal, 1996), best represented in Colombia and Ecuador. A single species is found in Puerto Rico, known elsewhere only in the Dominican Republic. Lesser Antillean populations combined with the Puerto Rican taxon by Borchsenius & Bernal represent several different species in the present writer's opinion.

TYPE: *Aiphanes aculeata* Willd.

Reference: Borchsenius, F. & R. Bernal. 1996 *Aiphanes* (Palmae). Fl. Neotrop. Monogr. 70: 1-95.

1. Aiphanes acanthophylla (Mart.) Burret, Notizbl. Bot. Gart. Berlin-Dahlem 11: 558. 1932; *Bactris acanthophylla* Mart., Palm. Orbig. 70. 1844. *Martinezia acanthophylla* (Mart.) Becc. in Urban, Symb. Antill. 8: 79.

1920. Type: Puerto Rico. *Wydler 192* (holotype: FI, photo at AAU; isotype: G).

Curima colophylla O. F. Cook, Bull. Torrey Bot. Club 28: 561. 1901. Type: Puerto Rico. *Underwood & Griggs 878* (US-3 sheets!).

Bactris pavoniana sensu Bello, Anales Soc. Esp. Hist. Nat. 12: 114. 1883, non Martius, 1824.

Solitary palm with relatively slender trunk, to 18 m tall and 20 cm in diam., armed with numerous blackish spines 4-7 cm long especially when young, these eventually deciduous. Leaves dark green, up to 2.5 m long, pinnatisect, the majority of the numerous segments linear or nearly so, in one plane, 3-6 cm broad, at apex obliquely erose-truncate; terminal leaf-segments broad, pinnately veined, deeply notched and irregularly short-lacerate. All parts of leaf variably armed with sharp blackish spines, or mature leaves spineless. Inner spathe (second primary bract) up to 1 m long, densely spiny; inflorescence usually more than 60 cm long; flowers greenish white, ca. 3 mm long. Fruits globose, bright red, ca. 1.5 cm in diam.

General distribution: Confined to Puerto Rico and the Dominican Republic.

Distribution in Puerto Rico: Occurs as an understory tree in forest over limestone (rarely serpentine) at low to middle elevations (50-400 m), uncommon or locally frequent. Recorded from Arecibo, Bayamón, Camuy, Cidra, Corozal, Dorado, Fajardo, Juncos, Maricao, Quebradillas, San Juan, San Lorenzo, Toa Alta, Toa Baja, Utuado, and Vega Baja.

Common name: Puerto Rico: *Palma de coyor.*

Note: Borchsenius & Bernal (1996) consider the correct name for this species to be *Aiphanes minima* (Gaertn.) Burret. However, the typification of this name is based on a single endocarp (fruit) from an unknown locality in the seed collection of Gaertner, collected more than 200 years ago. If the epithet "*minima*" is applied in a broad sense (as did Borchsenius & Bernal) to the Antillean populations which may represent several species (as the writer believes), then "minima" will have to be epi- or neotypified so that confusion will be avoided.

Selected specimens examined: PUERTO RICO: Bayamón: Candelaria, near Bayamón, *N.L. Britton et al. 2857* (US). Cidra: Pueblo Viejo, *Stevenson 2105* (US). Corozal: *N.L. Britton & E.G. Britton 7829* (US). Dorado: on the grounds of the Dorado Beach Country Club, *Read & Woodbury 2055a* (US-4). Fajardo: Río Arriba, *N.L. Britton & Shafer 1701* (US). Juncos: *Sintenis 2500* (US). Maricao: *Sintenis 484* (US). San Lorenzo: Monte Gregorio, *Sintenis 2628* (US). Toa Alta: *N.L. Britton & E.G. Britton 7854* (US). Toa Baja: Bo. Candelaria, wooded mogotes 0.4-0.7 km WSW of Pico Nevárez, *Proctor & Rivera 45638* (US-4). Utuado: *E.G. Britton & Marble 396* (US-2). Vega Baja: *Goll 1044* (US).

3. CALYPTRONOMA

Calyptronoma Griseb., Fl. Brit. W. I. 518. 1864.

Solitary, unarmed, monoecious palms, the trunk gray-brown and marked with prominent leaf-scars. Leaves pinnatisect; crownshaft lacking; petioles short, less than 50 cm long, clasping at base and with fibrous margins; segments linear-lanceolate, borne in one plane, the apices acute; minute chaffy scales borne abaxially on major veins. Inflorescences interfoliar, solitary in the axil of each leaf, with 3 (rarely 4) orders of branching; peduncular bract erect, coriaceous, splitting longitudinally on the abaxial side, attached near base of peduncle. Panicle branches borne in clusters on short stalks basally, but solitary distally, each subtended by a short bract and covered when young by arachnoid tomentum. Flowers borne in triads sunk in pits closed at first by pit bracts. Staminate flowers sessile; sepals 3, imbricate, unequal, linear-elliptic, keeled, with denticulate, hyaline margins; petals 3, basally adnate, to the staminal column and more or less connate, valvate or joined and calyptrate at apex; staminal tube funnel-form, fleshy, white, bearing 6 short, narrowly triangular filaments at its apex; anthers 6, sagittate, with introrse dehiscence; pistillode minute. Pistillate flowers sessile; sepals 3, linear-elliptic; petals 3, membranous, connate, opening by circumcissile dehiscence, falling together like a cap; staminode tubular-cupulate, inflated at apex; ovary superior, of 3 fused carpels; style slender, apically attached to the 3-lobed ovary. Fruit an obovoid drupe with a smooth epicarp, fleshy mesocarp and crustaceous endocarp; seed spheroid, shiny brown, with conspicuous encircling unbranched raphe and obscure hilum; embryo basal; endosperm

homogeneous. A Greater Antillean genus of 3 species, one of them occurring in Puerto Rico.

TYPE: *Calyptronoma occidentalis* (Sw.) H. E. Moore. (≡ Elaeis occidentalis Sw.).

Reference: Zona, S. 1995. A revision of *Calyptronoma* (Arecaceae). Principes 39: 140-151.

1. Calyptronoma rivalis (O. F. Cook) L. H. Bailey, Gentes Herb. 4: 171. 1938; *Cocops rivalis* O. F. Cook, Bull. Torrey Bot. Club 28: 568. 1901; *Calyptrogyne rivalis* (O. F. Cook) León, Contr. Ocas. Mus. Hist. Nat. Colegio "De La Salle" 3: 12. 1944. Lectotype: Puerto Rico. *Underwood & Griggs 89* (US!), designated by Zona, Principes 39: 149. 1995.

Calyptronoma quisqueyana L. H. Bailey, Gentes Herb. 4: 168. 1938; *Calyptrogyne quisqueyana* (L. H. Bailey) León, Contr. Ocas. Mus. Hist. Nat. Colegio "De La Salle" 3: 12. 1944. Lectotype: Haiti. *Bailey 729* (BH), designated by Zona, Principes 39: 149. 1995.

Calyptrogyne occidentalis sensu Britton & P. Wilson, Bot. Porto Rico 5: 113. 1923, non (Swartz) M. Gómez, 1893.

Trunk to 15 m tall, 18-25 cm in diam.; leaves 3.1-5 m long, the segments 54-× 3-6 cm, glabrous on the lower side between the veins. Peduncular bract 66-77 cm long, ca. 8.5 cm broad. Peduncle 39-77 cm long, 1.3-3 cm thick; rhachilla borne in clusters with 6(7) rows of floral pits, the proximal rachillae borne in clusters of 3-5 (-7) on stalks 1.4-5.2 cm long; clustered rachillae borne for ½ to ⅔ the length of the rachis; floral pits 2.4-3.5. Staminate flowers 4.8-5.1 cm long; sepals 3-3.6 mm long; petals completely connate; staminal tube 4.1-4.5 mm long; filaments 0.8-1.2 mm long; anthers 1.6-1.7 mm long. Pistillate flowers not yet described. Fruits 4.6-7 × 3.6-4.6 mm in diam.; seed 3.8-4.9 × 2.9-3.5 mm in diam.

General distribution: Puerto Rico and Hispaniola.

Distribution in Puerto Rico: Recorded from Camuy (along the Río Camuy), Quebradillas (along the Río Guajataca), and San Sebastián (along stream below Collazo Falls). The largest number of wild trees occurs along the Río Camuy. This species grows naturally only along the banks of streams and rivers at low elevations (35-150 m). However, it has been propagated extensively by seeds and has been planted rather widely.

Common name: Puerto Rico: *Manaca.*

Selected specimens examined: PUERTO RICO: Camuy: *Sintenis 6061* (US). Lares to San Sebastián, *N.L. Britton & Hess 2785* (US-4); *Liogier 28727* (US-2).

4. COCCOTHRINAX

Coccothrinax Sarg., Bot. Gaz. 27: 87. 1899.

Small to medium solitary (rarely clustered), mostly unarmed palms with slender columnar trunks these nearly smooth or obscurely ringed with leaf-scars; base of trunk often arising from a mass of exposed roots. Leaves palmate with fibrous tubular sheaths at base, these unarmed or sometimes spiny, becoming loosely mat-like to very hard like grillwork; petioles flat to convex on upper side and convex beneath, terminating at the blade in a hastula, solid throughout and not splitting at base within the sheath; hastula conspicuous on upper surface, beneath marked by a small ridge, flap, or projection. Leaf blade entirely flabellate, lacking a central costa, pleated during development; upper surface glabrous, the lower surface variously lepidote with minute appressed scales; segments variously fused toward base, the whole blade remaining somewhat pleated at maturity; segment apices bifid. Inflorescences interfoliar, elongate, erect to arching, mostly shorter than the leaves, with a few to many pendulous primary branches, these mostly bearing simple secondary branches; lowermost primary bract bicarinate, the others tubular with an oblique aperture; all primary bracts appressed-lepidote, each enclosing the base of a primary branch (rhachilla), each ultimate branch subtended by a narrow triangular bract. Flowers bisexual, mostly protandrous, solitary on short or prominent bracteolate pedicels; perianth a 6-lobed or -dentate cupule. Stamens usually 9-12 with straight slender filaments, these free to slightly connate at base; anthers basifixed, with oblong to linear locules dehiscing by lateral slits; ovary unilocular with a single ovule; style very short, flaring upwardly to a laterally-compressed stigma. Fruit small, depressed-globose, black or dark purple, smooth

except for apical stigma remnant and adherent base of perianth cupule; mesocarp thin, juicy; endocarp thin, membranous; seed globose, deeply grooved or brain-like; endosperm more or less ruminate by deeply folded or irregular lobes. A circum-Caribbean genus of 20 or more species, occurring on most of the islands and adjacent continental areas. One species is found in Puerto Rico and the Virgin Islands.

TYPE: *Coccothrinax jucunda* Sarg.

1. Coccothrinax alta (O. F. Cook) Becc., Webbia 2: 331. 1907; *Thrincoma alta* O. F. Cook, Bull. Torrey Bot. Club 28: 540. 1901. Type: Puerto Rico. *Underwood & Griggs 848* (holotype: US!).

Thringis latifrons O. F. Cook, Bull. Torrey Bot. Club 28: 545. 1901; *Coccothrinax latifrons* (O. F. Cook) Becc., Webbia 2: 326. 1907. Type. Puerto Rico; Coamo. *Sintenis 3278* (holotype: US!).

Thringis laxa O. F. Cook, Bull. Torrey Bot. Club 28: 545. 1901. Type. Puerto Rico; Vega Baja. *Cook & Collins 1041* (US!).

Coccothrinax eggersiana Becc., Webbia 2: 321. 1907. Type: St. John; U.S. Virgin Is. *Eggers 3117* (holotype: B; isotype: C).

Coccothrinax eggersiana var. *sanctae-crucis* Becc., Webbia 2: 323. 1907. Type: St. Croix; U.S. Virgin Is. *Benzon 75-1759* (holotype: C).

Coccothrinax sanctae-thomae Becc., Webbia 2: 303. 1907. Type: St. Thomas; U.S. Virgin Is. *Børgesen s.n.* (holotype: C).

Thrinax argentea sensu Eggers, Fl. St. Croix 100. 1879, non Loddiges, 1830.

Coccothrinax argentea sensu Britton & P. Wilson, Bot. Porto Rico 5: 117. 1923, non (Loddiges) Sargent, 1902.

Fig. 32. A-D

Erect solitary palm 2-6 (-11) m tall; trunk cylindrical, (5-) 8-12 cm in diam., slightly tapering toward apex. Leaves with orbicular blades up to 75 cm long, silvery-lepidote beneath, cleft beyond the middle into numerous narrowly lanceolate, acuminate segments; petioles about as long as the blades, the base expanded in a persistent, tubular, fibrous, sheath surrounding top of trunk below the growing point. Inflorescence erect or ascending, paniculate, solitary in leaf axils, with several pendulous primary branches, the rachillae glabrous. Flowers light yellow, on pedicels 1-3 mm long; perianth 2.5-3 mm wide; stamens usually 9. Fruits globose to depressed-globose, 5-6 mm in diam., purple-black when ripe.

General distribution: Endemic to Puerto Rico and the Virgin Islands.

Distribution in Puerto Rico and the Virgin Islands: This species is found at low to lower middle elevations (near sea level to 350 m), chiefly along the northern side of Puerto Rico, where it is confined to a limestone substrate, and in the various islands east of Puerto Rico, where it chiefly grows over igneous rocks. It probably grows on many of the smaller Virgin Islands not listed here. Recorded from Arecibo, Barceloneta, Coamo, Culebra, Dorado, Florida, Isabela, Manatí, Quebradillas, Toa Baja, Utuado, Vega Alta, Vega Baja, and Vieques; Guana Island, St. Croix (very rare), St. John, St. Thomas, Tortola, and Virgin Gorda.

Common names: Puerto Rico: *Palma plateada, Palma de abanico.*

Note: It has been suggested (Read, 1979, p. 329) that *Coccothrinax alta* may not be distinguishable from *C. barbadensis* (Lodd. ex Mart.) Becc. of the Lesser Antilles. However, *C. alta* is here maintained as a separate species because of its (on the average) shorter, more slender trunk, fewer stamens, and much smaller fruits (5-6 mm diam. vs. 7-12 mm diam.).

Selected specimens examined: PUERTO RICO: Arecibo: Bo. Río Arriba, *Axelrod 9404* (US). Coamo: On Monte Calabaza near Coamo, *Sintenis 3278* (US). Culebra: *N.L. Britton & Wheeler 52* (US-2). Vieques: *Little & Woodbury 23733* (US). Florida: Bo. Florida Adentro, 0.5 km along dirt road E of old quarry at Rt. 140, km 50.75, *Axelrod et al. 4668* (US-2). Vieques: Isabel Segunda to Santa Maria, *Shafer 2610* (US-2). ST. CROIX: Cotton Valley, *Little 16406* (US). ST. JOHN: Coral Bay Quarter; along dirt road to Bordeaux Mountain, *Acevedo-Rdgz. et al. 5089* (NY, UPRRP, US-3). ST. THOMAS: Flag Hill, *Shafer & Fitch 1470* (US-2); St. Peter, *E.G. Britton & Marble 1209* (US); Water Island, *E.G. Britton & Marble 1209* (US-2). TORTOLA: Guana Island, Palm Ghut, SE of North Beach, *Proctor 41996* (US-2). VIRGIN GORDA: *Little & Woodbury 23847* (US-2).

5. COCOS

Cocos L., Sp. Pl. 1188. 1753.

A monospecific genus believed to have originated somewhere in the region of Malaya or the Philippines Islands, now planted and spontaneous or naturalized in all tropical countries and some subtropical areas, especially along sandy seacoasts, characterized by the following species.

TYPE: *Cocos nucifera* L.

1. Cocos nucifera L., Sp. Pl. 1188. 1753. Lectotype: Malabar Is. Rheede, *Hort. Malab. 1: t. 1-4,* 1678, designated by H.E. Moore & Dransfield, Taxon 28: 64. 1979.

Medium to large, solitary, unarmed monoecious palm with arching pinnate leaves, 18-30 m tall, the often slanted or curved trunk 40-60 cm in diam., nearly smooth but ringed with broad leaf-scars and usually somewhat enlarged at base. Leaves arching, the petioles with fibrous netlike sheath that pulls apart from the petiole base as the leaf matures; petioles heavy, very short; blades 3-6 m long, 1 m or more broad, with 75-90 narrowly lanceolate segments on each side, these 50-70 cm long, 3.5-5 cm broad, all inserted regularly in one plane on the rachis. Expanded portion of inner inflorescence bract 90-120 cm long and 15-20 cm broad near the middle, somewhat glaucous. Inflorescence interfoliar, long-pedunculate, protandrous, mostly 1-2 m long, once-branched; primary bracts 2, persistent, very unequal in size, the outer bract bicarinate, truncate, the inner bract much larger, fusiform in bud, plicate-grooved, splitting abaxially; rachis and rachillae glabrescent; rachillae numerous (more than 100), each 30-40 cm long. Flowers unisexual, both sexes borne on the same inflorescence (rarely an entire inflorescence staminate), in 1-2 triads of two staminate and one pistillate flowers at base of each rhachilla, with single or paired staminate flowers above; pistillate flowers much larger than the staminate ones. Staminate flowers narrowly ovoid, somewhat asymmetrical, 1-1.5 cm long, sessile or pedicellate, the petals valvate and much longer than the sepals; sepals 2 mm long, free, imbricate at base; stamens 6; pistillode prominent, trifid. Pistillate flowers globose-conic, 2.5 cm long; sepals and petals similar, strongly imbricate; ovary 3-pistillate, with only a single carpel normally fertile, entire, rugose toward apex; stigmas 3, sessile. Fruits ovoid or ellipsoid, bluntly 3-angled, 20-30 cm long; exocarp smooth, green to yellow or orange; mesocarp thick and densely fibrous, 2-4 cm thick; endocarp bony and hard, with 3 large opercula toward one end; normally only one operculum covers an embryo; seed large, hollow, initially containing liquid endosperm that eventually dries and solidifies; seedling leaf bifid.

General distribution: Throughout the tropics, especially at low elevations, and also widespread in subtropical areas.

Distribution in Puerto Rico and the Virgin Islands: Common in nearly all municipalities and inhabited islands at low to middle elevations (sea level to ca. 500 m), mostly planted but frequently self-propagating. This is one of the world's most important economic trees; almost every part of the tree has some use. Further, the graceful and dramatic appearance of the coconut palm epitomizes and symbolizes the tropics.

Common names: Puerto Rico: *Coco, Cocotero, Palma de cocos, Coconut.*

Selected specimens examined: PUERTO RICO: Cabo Rojo: *Sintenis 749* (US). Cataño: *Goll 967* (US). Peñuelas: *Sintenis 4940* (US). San Juan: Río Piedras, *Stevenson 5605* (US). Yabucoa: *Sintenis 4941* (US). ST. CROIX: *Ricksecker 303* (US).

6. GAUSSIA

Gaussia H. Wendl., Nachr. Königl. Ges. Wiss. Georg-Augusts-Univ. 1865: 327. 1865.

Solitary, unarmed, monoecious palms, with tall, slender, flexible, tapering trunks enlarged at base and subtended by many tough prop-roots bearing small spine-like rootlets; trunks straight or sometimes

leaning. Leaves pinnate, the petioles bordered by a wide basal sheath, this split at maturity and not forming a crown-shaft. Leaf-segments inserted on rachis in a single plane, the rachis ridged on the upper side. Inflorescences interfoliar, protandrous, not long-persisting, paniculate; peduncular bracts 4-7, tubular with oblique open apices, the uppermost reaching base of first flowering branch; rachis about as long as the peduncle, primary branches numerous, crowded, spirally attached to rachis; rachillae slender, glabrous, lacking bracts, bearing spirally arranged rows of flowers, the lowest pistillate, the distal 2-7 staminate, the most distal one opening first. Staminate flowers larger than the pistillate ones; stamens 6; filaments subulate, the anthers sagittate or bifid; pistillode prominent, columnar. Pistillate flowers ovoid with rounded sepals and narrow petals; staminodes minute, tooth-like; ovary angled-ovoid with 3 recurved stigmas, 3-locular with a single ovule in each locule. Fruits ellipsoid or globose to kidney-shaped, red or orange when ripe, fleshy with smooth exocarp; seed not adherent to endocarp; endosperm homogeneous; embryo lateral. A small genus of 5 species, one endemic to Mexico, another found in Mexico, Belize, and Guatemala, two endemic to Cuba, and one species shared by Puerto Rico and the Dominican Republic.

TYPE: *Gaussia princeps* H. Wendl.

1. Gaussia attenuata (O. F. Cook) Becc., Pomona Coll. J. Econ. Bot. 2: 275. 1912; *Aeria attenuata* O. F. Cook, Bull. Torrey Bot. Club 28: 548. 1901. Type: Puerto Rico; Vega Baja. *G. F. Goll 1040* (holotype: US!).

Gaussia portoricensis H. Wendl. ex Kerch., Palmiers 245. 1878, *nom. nud.*

Palm 8-12 (30) m tall; trunk basally enlarged to 25 cm in diam., tapering upwardly to a minimum diam. of (5-) 7-10 cm just below the leaves. Leaves mostly 5-7, erect or spreading; petiole sheath green, 20-30 cm long; leaves (including petiole and sheath) 1-1.8 m long, with angular rachis; leaf-segments numerous, the longest ones 20-30 cm long, 3 cm broad, the more distal ones much shorter, all acute to acuminate at apex. Inflorescences much shorter than the leaves; panicle branches numerous and densely arranged, simple or forked, up to 25 cm long. Flowers sessile, orange-yellow, the staminate ones ca. 3 mm long, the pistillate ca. 2 mm long. Fruits obovoid, orange-red, 8-10 mm in diam.

General distribution: Puerto Rico and Dominican Republic.

Distribution in Puerto Rico: Confined to rocky limestone hills and outcrops at low to lower middle elevations (5-250 m). Recorded from Arecibo, Dorado, Isabela, Juana Díaz, Manatí, Quebradillas, San Germán, Toa Baja, Vega Alta, and Vega Baja.

Common names: Puerto Rico: *Llume, Palma de lluvia.*

Selected specimens examined: PUERTO RICO: Juana Díaz: Peña de Las Cuevas, near Juana Díaz, *E.G. Britton & Marble 2298* (US). Toa Baja: *Little 16304* (US-2). Vega Baja: *N.L. Britton & Cowell 1421* (US-2).

7. PRESTOEA

Prestoea J. D. Hook. in Bentham & J. D. Hooker, Gen. Pl. 3: 889. 1883, *nom. conserv.*

Small to medium, usually solitary, unarmed, monoecious palms, with trunks lightly banded by leaf-scars. Leaves spreading or arching, pinnate, the sheaths tubular, splitting opposite the petiole, forming a short, partially open crownshaft; petioles elongate; leaf-segments regularly inserted on the rachis in a single plane. Inflorescences sometimes interfoliar in bud but becoming intrafoliar at anthesis and in fruit, paniculate with simple branches; peduncles elongate, terete or nearly so, the first and second nodes bearing large, markedly unequal, deciduous primary bracts the first much shorter than the second; rachillae glabrous to puberulous or lepidote, stiffly ascending or spreading in all directions from a terete rachis. Flowers borne superficially in triads of a single pistillate flower subtended by two small bracteoles, flanked by two staminate flowers. Staminate flowers often stipitate, with sepals imbricate at base and petals valvate; stamens 6; pistillode prominent. Pistillate flowers with free, imbricate sepals and petals; staminodes present; ovary slightly stipitate. Fruits globose, 1-seeded, black or deep purple

when ripe; seeds with ruminate endosperm. Seedling leaves bifid. A Neotropical genus of 28 species (Read, 1979) or 10 species (Henderson & Galeano, 1996). A single species occurs in Puerto Rico.

TYPE: *Prestoea pubigera* (Griseb. & H. Wendl.) J. D. Hook. (*Hyospathe pubigera* Griseb. & H. Wendl.).

Reference: Henderson, A. & G. Galeano. 1996. *Euterpe*, *Prestoea*, and *Neonicholsonia* (Palmae). Fl. Neotrop. Monogr. 72: 1-89.

1. Prestoea montana (Graham) G. Nicholson, Ill. Dict. Gard. 3: 216. 1886; *Euterpe montana* Graham, Bot. Mag. 67: t. 3874. 1841; *Prestoea acuminata* var. *montana* (Graham) An. Hend. & Galeano, Fl. Neotrop. Monogr. 72: 53. 1996. Lectotype: Grenada. *Bot. Mag. t. 3874*, 1841, designated by An. Hend. & Galeano, Fl. Neotrop. Monogr. 72: 53. 1996.

Acrista monticola O. F. Cook, Bull. Torrey Bot. Club 28: 557. 1901. Type: Puerto Rico; Luquillo Mts. *Sintenis 1525* (holotype: US!).

Euterpe oleracea sensu Bold., Fl. Ned. W. Ind. Eil. 139. 1913, non Martius, 1824.

Oreodoxa oleracea sensu Bello, Anales Soc. Esp. Hist. Nat. 12: 114. 1883, non Martius, 1824.

Euterpe globosa sensu authors, incl. Britton & P. Wilson, Bot. Porto Rico 5: 113. 1923, non Gaertner, 1788.

Small to medium-sized palm, up to ca. 15 m tall; trunk 12.5-20 cm in diam., prominently ringed by leaf scars. Leaves more or less arcuate; blades up to 3.5 m long with numerous flat dark glossy green segments; sheaths 30-90 cm long, forming a short, poorly defined crownshaft which approximately equals the mature inflorescence bracts in length, splitting opposite the petiole, fibrous, and densely pale-lepidote distally, becoming glabrescent with age; petioles 50-75 cm long, densely lepidote abaxially, the crowded appressed scales fimbriate-stellate, mostly falling off with age; leaf-segments chiefly 30-50 on each side of the rachis, usually 40-70 cm long (or slightly shorter or longer and mostly 3-4.5 cm broad near the middle), the upper (adaxial) surface usually glabrous but the mid rib of with a continuous line of persistent, overlapping, dark-membranous, peltate scales, or similar scales present but widely separated. Inflorescences 2-several, infrafoliar, not erect in bud, in length about equaling the crownshaft; peduncles 10-20 cm long, densely appressed-lepidote with pale to dark stellate scales; primary bracts leathery or sub-woody in texture, usually inserted 3-5.5 cm apart on the peduncle, the first (outer) bract more or less glabrescent, 15-45 cm long, about half the length of the second (inner) bract, the latter densely matted brown-lepidote; rachis ± terete, glabrous or nearly so, bearing 25-50 divaricate branches, these chiefly 10-50 cm long, white or lavender at anthesis, often turning red in fruit, glabrous or nearly so, dilated basally to a broad insertion. Flowers white to lavender, pink, or magenta, subtended by 2 or 3 small bracteoles, in triads (usually 2 staminate with 1 pistillate). Staminate flowers pedicellate; sepals glabrous, unequal, 1.2-2 mm long., imbricate; stamens white, the anthers 1.8-2.5 mm long; pistillode prominent, variously configured. Pistillate flowers sunken in the rachillae; sepals ca. 2.5 mm long, glabrous, subequal, rounded and concave, minutely ciliate or serrulate; petals 3-4 mm long, glabrous, broadly imbricate, deeply concave, opening only enough to expose the receptive stigmas; staminodia 6; ovary with very short style and 3 stigmas that spread apart when receptive. Fruits sunken in the rachillae, 10-12 mm in diam. with conspicuous subapical stigmatic remains, and basally a persistent perianth; seeds 9-10 mm in diam. with a conspicuous adaxial raphe; endosperm ruminate. Seedling leaf bifid.

General distribution: Throughout the moist to wet mountains of the Greater and Lesser Antilles, but absent from Jamaica and the Virgin Islands.

Distribution in Puerto Rico: Frequent to abundant in moist or wet montane (rarely submontane) forest. Recorded from Adjuntas, Aguas Buenas, Arecibo, Barranquitas, Bayamón, Cayey, Jayuya, Maricao, Naguabo, Orocovis, Patillas, Ponce, Río Grande, San Lorenzo, Utuado, and Yauco.

Common name: Puerto Rico: *Palma de Sierra.*

Note: Prestoea montana was reduced to a variety of the South American *Prestoea acuminata* (Willd.) H. E. Moore by Henderson & Galeano (1996). However, the present writer prefers to maintain the disjunct Antillean populations at the

species level as they are easily distinguished from the Central and South American relatives. This Antillean palm has been the subject of numerous ecological studies, and recognizing it at the species level allows us to both retain the commonly used name *Prestoea montana* and to maintain nomenclatural consistency throughout the ecological and floristic literature. *Prestoea montana* can be distinguished from its Central and South American relatives by its usually glabrous and ± terete rachillae, and by its flowers and fruits being superficial on the rachillae [vs. rachillae pubescent (covered with crustose or granular hairs or with long, flexuous hairs) and angular, and flowers and fruits somewhat sunken in the rachillae].

Selected specimens examined: PUERTO RICO: Adjuntas: Alto de la Bandera, near Adjuntas, *N.L. Britton & Shafer 2122* (US). Cayey: 13 km N of Cayey, *Underwood & Griggs 340* (US-3). Maricao: Maricao to Monte Alegrillo, *N.L. Britton et al. 2624* (US). Naguabo: Sierra de Naguabo, *Stevenson 5268* (US). Río Grande: Sierra de Luquillo, *Sintenis 1525* (NY, US).

8. PSEUDOPHOENIX

Pseudophoenix H. Wendl. ex Sarg., Bot. Gaz. 11: 314. 1886.

Medium to large, unarmed, solitary palms; trunk somewhat waxy, distinctly bended with leaf-scars. Leaves pinnate, the sheaths waxy, glaucous, gray-green, splitting opposite the petiole, abscising and shedding cleanly; petioles deeply concave above, convex beneath, glabrous except for small rusty-brown scales along the margins. Leaf-segments inserted along the rachis in groups of 2-6, those of the lower half of the leaf a various angles, those of the distal half more regularly spaced and in one plane; lowest several segments much reduced and more crowded; each segment with a pulvinus at the acute angle of insertion at the rachis; upper (adaxial) surfaces dark green, often waxy-glaucous, with 1-5 prominent veins; lower (abaxial) surfaces lighter in color, with many minute corrugations. Inflorescences interfoliar, 3 or 4 times branched, arching among the leaves or pendulous; peduncles strongly flattened, the first and second nodes with large, leathery persistent primary bracts, these splitting irregularly, their margins usually bearing large, tufted brown scales; first bract normally longer than and completely enclosing the second; the third node frequently with a short, collar-like bract encircling the peduncle. Flowers bisexual, the buds stalked (but not pedicellate), ovoid, green, usually glaucous, each subtended by a minute, acuminate bract; each pseudo-pedicel a constricted elongation of the receptacle. Calyx lobes triangular with rounded, apiculate angles; petals 3, ovate, thick, fleshy, concave, valvate, much longer than the calyx; stamens 6, in two whorls, the outer whorl more or less adnate to the petals; filaments thin, dilated at base and often connate, forming a short cupule; anthers sagittate, 2-locular, opening by longitudinal slits. Pistil conic, with 3 glands located basally opposite the outer whorl of staminal filaments; stigmas 3, sessile, recurving only for a short period each day, then remaining recurved after fertilization; ovary 3-locular. Fruits globose or with 2 or 3 lobes (according to the number of seeds), waxy-red when ripe, attached to rachillae by pseudo-pedicels and subtended by the persistent perianth and staminal filaments; endocarp hard, brown, smooth; seeds nearly spherical, the raphe radiating on both sides in flexuous branches; endosperm hard, solid, white. Seedling leaf lanceolate, entire. A primarily West Indian genus of 4 species, one of wide distribution in the region, the other 3 confined to Hispaniola.

TYPE: *Pseudophoenix sargentii* H. Wendl. ex Sarg.

Reference: Read, R. 1968. Gentes Herb. 10: 169-213.

1. Pseudophoenix sargentii H. Wendl. ex Sarg., Bot. Gaz. 11: 314. 1886. Type: United States; Florida. *Sargent s. n.* (holotype: A; isotype: GH).

Small palm up to 8 m tall, the trunks mostly 20-30 cm in diam. somewhat enlarged toward the base. Leaves ascending or arching, 1.5-3 m long; sheaths 15-30 cm long; petioles 20-50 cm long, 4-6 cm wide at base, narrowing to 1.5-2 cm at base of blade; blades asymmetric with an oblique outline at base, with 87-127 segments on each side of

rachis, inserted singly or in groups of 3-5 at diverse angles; lowermost segments greatly reduced with 7-17 occurring in the first 10 cm of rachis; bases of segments strongly complicate, 1-5 mm wide between the edges; mid rib at base of segments normally bearing tufts of brown scales. Inflorescences green, compact, divaricate, erect among the leaves and 75-120 cm long, or projecting immediately below the leaves and 90-170 cm long; 3 or 4 times branched; all branches at right angles to the main or secondary axes; ultimate branches 1-5.5 cm long; peduncle 35-75 cm long; outer and inner primary bracts subequal, always shorter than the peduncle, splitting only near apex. Flower buds dark green, glaucous, 20-50 per branchlet; pseudo-pedicels mostly 3-6 mm long; up to 1.2 mm in diam.; calyx a triangular cup with apiculate angles; petals spreading or reflexed, 6-6.6 mm long; staminal filaments cuspidate, 3.3-4 mm long, the dilated bases fused to form a very short cupule adnate to the petals. Ripe fruits globose if 1-seeded, or 2- or 3-lobed if 2- or 3-seeded. Ripe 1-seeded fruits when fresh 1.2-1.7 mm in diam.; pericarp wrinkled when dry; endocarp subspherical, 0.8-1.2 mm in diam.

General distribution: Littoral habitats widespread through the northern Caribbean from the Yucatan Peninsula through the Florida Keys, northern Cuba Keys, some of the Bahamas, Hispaniola, Navassa, Saona, and Mona islands, and also an isolated station on Dominica in the Lesser Antilles. It is, however, absent from the Cayman Islands and Jamaica.

Distribution in Puerto Rico and the Virgin Islands: Known only from Mona Island, where a small grove of 26 trees occurs. Seedlings originating from these trees have been distributed in Puerto Rico and St. Croix for horticultural use. The Mona Island trees grow near sea level in rather dry but dense coastal woodland over dolomitic limestone. These trees average ca. 6 m tall.

Selected specimens examined: PUERTO RICO: Mona Island: 0.8 km WNW of Uvero, *Proctor et al. 45905* (FTG).

Cultivated Species

Pseudophoenix vinifera (Mart.) Becc. was cited by Martorell et al. (1981) as cultivated in Puerto Rico.

9. ROYSTONEA

Roystonea O. F. Cook, Science, ser. 2, 12: 479. 1900.

Medium to very large, solitary, unarmed, monoecious palms; trunk columnar, or differentially swollen, mostly gray or light brownish to nearly white, often ringed by leaf-scars. Leaves pinnate, the segments not plane, extending at various angles. Sheaths tubular, forming a large, elongate, conspicuous, green crownshaft this eventually abscising cleanly. Petioles relatively short. Inflorescences intrafoliar, produced at the base of the crownshaft, much-branched; peduncle short, strongly fibrous, the first and second nodes bearing large, markedly unequal, coriaceous primary bracts, these soon shed as the inflorescence develops, the outer bract strongly bicarinate, winged, truncate at apex, the inner bract 1-2 m long, fusiform, smooth, splitting longitudinally, inflorescence branches white, prior to exposure embedded in a copious mass of free farinaceous trichomes. Flowers sessile, unisexual, but with prominent pistillode or staminodes, typically in triads of one pistillate flower accompanied by two staminate ones. But often just two or single staminate flowers occur. Staminate flowers with 3 imbricate sepals and 3 petals, the latter joined at base, valvate above, and acute at apex; stamens usually 6, the pistillode prominent. Pistillate flowers with 3 broadly imbricate sepals and 3 valvate petals; staminodes joined in a crenulate or stellate ring; pistil conic, 3-pistillate and with 3 stigmas, the stigmatic remains persisting conspicuously on one side near base of the fruit. Fruits oblong, globose, or curved-pyriform, less than 2 cm long, purplish to nearly black; exocarp very thin; mesocarp soft and juicy; endocarp a firm, thin shell within which the seed is usually free at maturity; usually 1-seeded; endosperm white, homogeneous. Seedling leaf lanceolate. A circum-Caribbean genus of 10 species (Zona, 1996), widely planted in tropical regions. A single species occurs naturally in Puerto Rico and the Virgin Islands. At least two other species are occasionally planted in our area.

TYPE: *Roystonea regia* (Kunth) O. F. Cook (≡ *Oreodoxa regia* Kunth)

Reference: Zona, S. 1996. Fl. Neotrop. Monogr. 71: 1-35. 1996.

1. **Roystonea borinquena** O. F. Cook, Bull. Torrey Bot. Club 28: 552. 1901. Type: Puerto Rico; Luquillo Mts. *Sintenis 1605* (holotype: US!; isotypes: GH, MO, NY, P).

Roystonea hispaniolana L. H. Bailey, Gentes Herb. 4: 268. 1939. Type: Dominican Republic. *Bailey 242* (holotype: BH).

Roystonea hispaniolana f. *altissima* Moscoso, Cat. Fl. Domingensis 63. 1943. Type: not seen, perhaps not extant.

Roystonea peregrina L. H. Bailey, Gentes Herb. 8: 127. 1943. Type: Guadeloupe? A cultivated plant of uncertain origin. *Questel 51* (holotype: BH).

Fig. 32. E-G

Trunk columnar 18 m tall or more, the grayish to grayish brown trunk mostly 40-50 cm in diam. in the lower part but often expanding to as much as 60 cm just below the crownshaft, nearly smooth throughout. Leaves usually 12-15, ascending and arching, several hanging well below the horizontal, mostly 3-4 m long; crownshaft 1.5-1.7 m long; petioles 30-55 cm long; leaf-segments numerous, mostly 60-100 cm long (shorter toward the ends, longest near the middle), 2.5-5 cm broad, linear, folded toward base, with a prominent mid rib. Inflorescences 1-1.4 m long, twice branched, much shorter than the leaves. Staminate flowers whitish or creamy yellow with 6-9 stamens and bright purple anthers, the petals 6.3-6.4 mm long, the pistillode minute. Pistillate flowers also creamy yellow to whitish, but with shorter petals 2.4-4.4 mm long; staminodial cup shallowly 6-lobed. Fruits spheroid to ellipsoid, 11.6-15 mm long, light brown to nearly black when ripe. Seeds oblong-ellipsoid to globose, ca. 9 mm long.

General distribution: Puerto Rico, Virgin Islands, and Hispaniola.

Distribution in Puerto Rico and the Virgin Islands: This species grows naturally in moist, deep soils at low to middle elevations (near sea level to ca. 300 m), additionally it is widely planted. The statement by Zona (1996) that this species in Puerto Rico grows only on soils derived from limestone cannot be supported. Also, the synonymization of *Roystonea hispaniolana* under *R. borinquena* deserves further evaluation. This species is more common than its few records seem to indicate. Recorded from Arecibo, Coamo, Culebra, Dorado, Juana Díaz (planted), Naguabo (planted), Río Grande, San Germán, San Juan, San Sebastián, Utuado, Vieques, Villalba; St. Croix, St. John, and Tortola.

Common names: Puerto Rico: *Palma real, Palma real puertorriqueña, Palma de yaguas.*

Selected specimens examined: Puerto Rico: Coamo: Coamo Springs, *Goll 736* (US). Naguabo: *N.L. Britton & E.G. Britton 7813* (US). Río Grande: Sierra de Luquillo, *Sintenis 1605* (US). San Juan: Río Piedras, *Little 16431* (US). Vieques: Playa Grande to La Mina, *Shafer 3006* (US). St. Croix: Fountain Valley Golf Course, *Fosberg & Hayes 58958* (US).

Cultivated Species

Roystonea regia (Kunth) O. F. Cook., the Cuban Royal Palm, is occasionally cultivated on Puerto Rico and the Virgin Islands (St. Thomas). *Roystonea oleracea* (Jacq.) O.F. Cook and *R. venezuelana* L. H. Bailey were cited by Martorell et al. (1981) as cultivated in Puerto Rico.

10. SABAL

Sabal Adans., Fam. Pl. 2: 495. 1763.

Small to large, solitary, unarmed palms; trunk massive or rarely slender or (in one species) decumbent and subterranean to ascending, often shaggy with persistent split petiole bases, or in some species or individuals these bases soon deciduous, leaving a clean, naked trunk ringed with leaf-scars. Leaves costapalmate, flabellate with a strong central costa that is an extension of the petiole. Petioles elongate, rounded beneath (abaxially) channeled on upper (adaxial) side, with sharp margins, split at base of sheath portion; leaf-costa usually elongate and down-curved in most species; segments plicate and connate through most of their length, the apices free and bifid, the margins often bearing numerous free threadlike fibers; hastula prominent at base of blade on upper (adaxial) side. Inflorescences interfoliar, compound-paniculate the axes mostly covered by obliquely pointed, tubular, sheathing bracts, except the penultimate

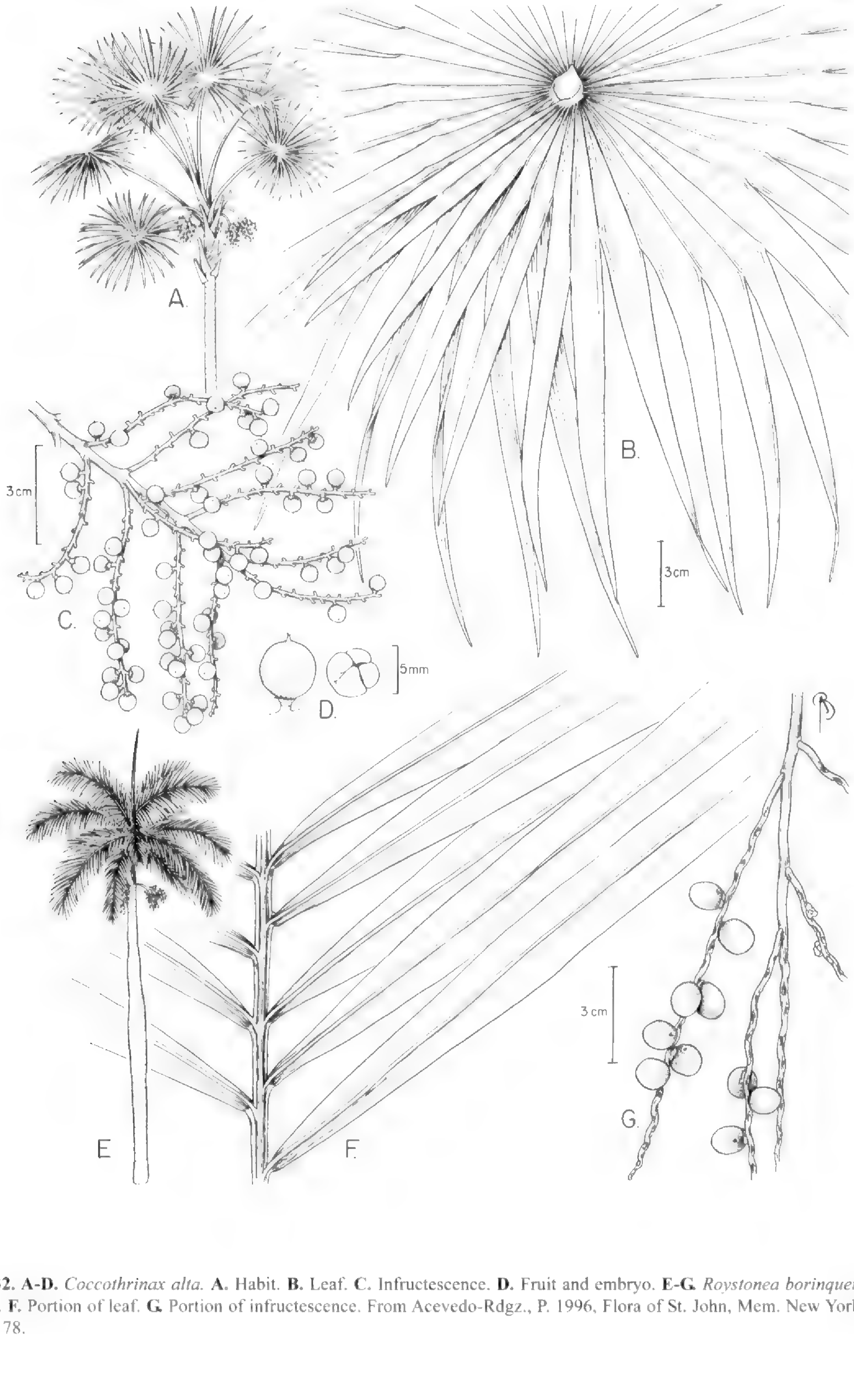


Fig. 32. A-D. *Coccothrinax alta.* **A.** Habit. **B.** Leaf. **C.** Infructescence. **D.** Fruit and embryo. **E-G.** *Roystonea borinquena.* **E.** Habit. **F.** Portion of leaf. **G.** Portion of infructescence. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

and ultimate branches. Flowers bisexual, sessile, solitary; calyx cupular, tridentate; petals concave, valvate toward apex; filaments subulate, connate at base and adnate to base of the corolla; ovary 3-pistillate; style as long as or longer than the ovary, grooved on 3-sides; stigma undivided, slightly capitate, minutely papillose. Fruits globose to sub-pyriform, brown or black when ripe, 1-seeded; mesocarp fleshy, endocarp membranous. Seeds depressed-globose; endosperm homogeneous. Seedling leaf narrowly lanceolate. A broadly circum-Caribbean genus of 26 species (Read, 1979) or 15 species (Zona, 1990). One species occurs naturally in Puerto Rico and the Virgin Islands; another has been widely planted, especially in St. Croix, where it is somewhat naturalized.

LECTOTYPE: *Sabal adansonii* Guers. (≡ *Corypha minor* Jacq.; *Sabal minor* (Jacq.) Pers.), designated by O.F. Cook, Bull. Torrey Bot. Club 28: 529-530. 1901.

Reference: Zona, S. 1990. A monograph of *Sabal* (Arecaceae: Coryphoideae). Aliso 12 (4): 583-666.

Key to the species of *Sabal*

1. Trunk 20-35 cm in diam.; leaves evenly green, not glaucous; fruits black, 13-18 mm in diam ..... 1. *S. bermudiana*
1. Trunk 40-75 cm in diam.; leaves green or somewhat glaucous; ripe fruits dark brown, 5.9-8(10) mm in diam. ..... 2. *S. causiarum*

1. Sabal bermudiana L. H. Bailey, Gentes Herb. 3: 326. 1934. Lectotype: Bermuda. *Bailey et. al. 73* (BH), designated by Zona, Aliso 12: 624. 1990.

Sabal princeps Becc., Webbia 2: 59. 1907; *Sabal beccariana* L. H. Bailey, Gentes Herb. 4: 387. 1940, *nom. illeg.* Lectotype: A plant cultivated in Palermo, Italy. *Mattei s. n.* (FI), designated by L.H. Bailey, Gentes Herb. 4: 387. 1940.

Sabal blackburniana sensu Britton & P. Wilson, Bot. Porto Rico 5: 116. 1923, non Glazebrook 1829.

A slow-growing palm with a stout trunk up to 7 m tall, 20-35 cm in diam., gray and obscurely to prominently ringed with leaf-scars. Petioles 1-2 m × 2.7-4 cm, longer than the blades; hastula acute to acuminate, 8.5-18.5 cm long, glabrous or nearly so, the margins flat, revolute or involute; blades up to 1.5 m long, with 85-95 segments per leaf, these 3.2-4.4 cm wide, joined at base for ca. 50 % of their length, the free portion long-bifurcate, the tissue firm and light green on both sides; margins bearing few to many hair-like filaments. Inflorescences arcuate, not exceeding the petioles in length; sheathing bracts usually lepidote; penultimate branches short and often not emergent beyond the subtending bracts of the main axis; ultimate branchlets 4-14 cm long. Flowers 4-6 mm long at anthesis; filaments 3. 1-4.5 mm long; pistil short, stout. Fruits pyriform, black when ripe, with thick pericarp; seeds oblate-concave, 7.5-12.5 mm in diam., often with a sharp funicular beak.

General distribution: endemic to Bermuda, but widely cultivated elsewhere.

Distribution in the Virgin Islands: Reported by Britton & P. Wilson (1923) as commonly planted in St. Croix and St. Thomas, where its leaves were "used for making hats and in basketry". Subsequently it became somewhat widely naturalized on St. Croix, especially in the southern part, but more recently has been much reduced in numbers by housing development. No up-to-date information is available on the status of this species on St. Thomas. It is planted on St. John.

Selected specimens examined: ST. THOMAS: Charlotte Amalie, *N.L. Britton & Rose 1397* (US).

2. Sabal causiarum (O. F. Cook) Becc., Webbia 2: 71. 1907; *Inodes causiarum* O. F. Cook, Bull. Torrey Bot. Club 28: 531. 1901. Type: Puerto Rico. *Underwood & Griggs 154* (holotype: US!, isotype: NY).

Inodes glauca Dammer in Urban, Symb. Antill. 4: 127. 1903. Type: Puerto Rico; near Peñuelas. *Sintenis 4844* (holotype: B, destroyed; isotypes: GH, MO, P, US!).

Sabal haitensis Becc., Ann. Roy. Bot. Gard. (Calcutta) 13: 293. 1931(1933). Type: Haiti. *Buch s. n.* (holotype: B, destroyed, fragment

FI).

Sabal questeliana L. H. Bailey, Gentes Herb. 6: 422. 1944. Type: St. Barthelemy. *Questel 468* (holotype: BH).

Sabal umbraculifera sensu Bello, Anales Soc. Esp. Hist. Nat. 12: 114. 1883, non Martius, 1824.

Fig. 62. G

Large, heavy-trunked palm up to 16 m tall, the trunk gray, slightly rough in texture, and faintly ringed with leaf-scars. Petioles 1-2 m long, up to nearly 5 cm wide, equaling or exceeding the blades in length; hastula acute, up to 21 cm long or more, glabrous or nearly so, with margins often prominently upturned; blades usually 1.5-2 m long, with 60-120 segments per leaf, these 2.5-5.8 cm wide joined basally for ca. 49 % of their length, the free portion long-bifurcate; tissue firm, light green on upper (adaxial) side, usually somewhat glaucous beneath; numerous hair-like filaments borne from the sinuses between the segments. Inflorescences arcuate, conspicuously equaling or extending beyond the leaves; primary bracts strongly pointed; ultimate branchlets slender, glabrous, 3-8 cm long. Flowers white, slightly fragrant, 2.7-5.2 mm long at anthesis; filaments 2.8-4.5 mm long; pistil short, stout. Fruits globose to globose-pyriform, often asymmetric; seeds oblate-concave, 5.9-8 (-10) mm in diam., dark glossy brown.

General distribution: Hispaniola (southern coasts of Haiti and the Dominican Republic), Puerto Rico and the Virgin Islands.

Distribution in Puerto Rico and the Virgin Islands: This species, which grows naturally chiefly near sea level (up to 100 m), seems to be indifferent as to substrate, occurring on sandy soils in some areas but elsewhere over limestone and different types of igneous rock (e. g., andesite on Guana Island). It is frequently planted and cultivated for its massive, stately appearance. A famous avenue of these trees can be seen along the "Malecon", the seafront boulevard of the city of Santo Domingo. Recorded from Aguadilla, Cabo Rojo, Camuy, Guánica, Isabela, Peñuelas, Ponce, Quebradillas, San Juan, San Sebastián, Yabucoa, and Yauco (although cultivated in many other localities); Anegada, Guana Island, St. Croix (sight record), and Tortola (cultivated).

Common names: Puerto Rico: *Palma de sombrero, Palma de escoba.*

Selected specimens examined: PUERTO RICO: Cabo Rojo: Cabo Rojo to Joyuda, *N.L. Britton et al. 2403* (US). Camuy: *Stevenson 5152* (US). Isabela: Bo. Jobos, *Proctor et al. 41885* (US). Peñuelas: *Sintenis 4844* (US). Ponce: Ponce to Peñuelas, *N.L. Britton et al. 1775* (US). Quebradillas: *Goll 955* (US-2). San Juan: Río Piedras, *Little 16307* (US). Yabucoa: *Sintenis 5286* (US). Yauco: *N.L. Britton & Shafer 1892* (US). ANEGADA: N.L. *Britton & Fishlock 1061* (US); *Acevedo-Rdgz. & Smith 11044* (US).

Cultivated Species

Sabal palmetto (Walter) Lodd. ex Schult. f. is sometimes cultivated in Puerto Rico and St. Croix, its natural range includes southeastern United States, the Bahamas, and Cuba. This has thus far shown no tendency to become naturalized.

11. THRINAX

Thrinax Sw., Prodr. 4, 57. 1788.

Small to medium, solitary, unarmed palms; trunk rather slender, columnar, at base growing from a dense mass of roots forming a small mound above the rocky substratum, above smooth or fibrous, obscurely ringed with leaf-scars. Leaves palmate; sheaths fibrous, tubular at first, later becoming netlike; petioles flat on upper (adaxial) side, convex beneath, terminating at base of blade in the hastula, splitting at base within area of sheath; hastula conspicuous, with an adaxial ridge, flap or small projection. Leaf blade flabellate, lacking a central costa; upper (adaxial) surface glabrous; lower (abaxial) surface variously lepidote; segments joined basally to form a plicate continuous surface, free outwardly, tapering to a bifid apex. Inflorescences interfoliar, elongate, erect to arching, with several or numerous pendulous branches, these in turn usually simple-branched; lowest primary bract bicarinate, the others tubular with an oblique aperture; all primary bracts densely appressed-lepidote, each enclosing the base of a primary

branch; primary branches each with a bicarinate and bifid bract inserted midway along the flattened peduncle and partially enclosing the flowers before anthesis; each ultimate branch subtended by a narrow triangular bract. Flowers bisexual, mostly protandrous, solitary on prominent or very short bracteolate pedicels. Perianth a 6-lobed or-dentate cupule not enclosing the reproductive parts; stamens usually 6-12 (sometimes fewer or more), the filaments straight, slender, and free, the anther locules opening by lateral slits. Pistil 1-locular, 1-ovulate, the style flaring upwardly to a laterally-compressed, funnel-shape stigma. Fruits small, depressed-globose, white when ripe; mesocarp thin, mealy; seeds depressed-globose, smooth, tan when fresh; endosperm homogeneous. Seedling leaf lanceolate, entire. A genus of four species, two of them endemic to Jamaica, the other two widely distributed from Honduras to Mexico and Florida, also in the Bahamas, and in the Antilles eastward to Barbuda. The two widespread species are not, however entirely sympatric, as only *T. morrisii* occurs in Puerto Rico, the Virgin Islands, and the western Lesser Antilles.

TYPE: *Thrinax parviflora* Sw.

1. Thrinax morrisii H. Wendl., Gard. Chron. ser. 3, 11: 104, f. 20, 21. 1892. Lectotype: Anguilla, Lesser Antilles. *Nicholls, s. n.* (K), designated by Read, Smithsonian Contr. Bot. 19: 88. 1975.

Thrinax microcarpa Sarg., Gard. & Forest 9: 162. 1896. Type: United States; Florida. *Curtiss 2679* (holotype: NY).

Thrinax praeceps O. F. Cook, Bull. Torrey Bot. Club 28: 536. 1901. Type: Puerto Rico. *Cook 850* (holotype: US!).

Thrinax ponceana O. F. Cook, Bull. Torrey Bot. Club 28: 536. 1901. Type: Puerto Rico; Ponce. *Cook 1005* (holotype: US!).

Fig. 62. H, I

Small to medium palm 1-10.5 m tall, often producing flowers and fruits when very low in stature and remaining permanently low under harsh growth conditions; trunk (5-) 18-35 cm in diam. near base, slightly tapering upward, ashy gray, smooth to fibrous, with leaf and inflorescence scars sometimes evident, the whole trunk sometimes forming a network of intersecting cracks with age. Leaf sheath 28-60 cm long, soon breaking apart and separating from the petiole apically, becoming somewhat netlike, densely velvety at first, soon becoming glabrescent; petioles 27-54 cm long, at first densely white-lepidote abaxially, soon glabrescent; hastula ovate, obtuse or rarely pointed, erect, thin, 0.2-0.8 cm long, up to 3 cm wide, densely velutinous, ciliate, at first, also with conspicuous tufts of white or silvery indumentum, becoming glabrescent. Developing leaf blades densely appressed-lepidote on all surfaces; expanded leaf blades usually glossy green on upper surface, often becoming somewhat glaucous or blue-green with age, variously lepidote beneath, the minute scales hyaline, fimbriate, and somewhat interlocking, becoming glabrescent with age. Mature leaf blades nearly circular in outline, mostly 75-150 cm in diam., the 33-58 segments (rarely all of these lying in the same plane), rigid or flexuous, the longest middle ones 55-75 cm long and mostly 3.5-4.8 cm wide, widest at point of fusion, bifid at apex. Inflorescences 55-100 cm long, erect or arching equaling or exceeding the leaves; primary bracts silvery-white to tan-lepidote, often apically tufted with long white scales; primary branches 9-21, glabrous, pendent or at first tufted-arcuate, mostly 9-30 cm long at anthesis; ultimate branches numerous, mostly 5.5-14.5 cm long, subtended by narrow triangular bracts. Flowers white, becoming pale yellow or pale orange with age, attached to inconspicuous disc-like pedicels with triangular bracteoles; perianth-lobes triangular-apiculate; stamens mostly 6, the filaments broadly connate at base, forming a cup; anthers exceeding the pistil in length; stigma minutely funnel-shaped, ciliate. Mature fruits globose, variable in size (often on the same inflorescence), (3.5-) 4-4.5 (-8) mm in diam., on pedicels 0.1-0.8 mm long. Seeds mahogany brown, usually with a small cavity at base. Flowering usually in May and June.

General distribution: Florida, Bahamas, Turk & Caicos Islands, Greater Antilles and some associated small islands (but not Jamaica), eastward to Barbuda in the Leeward Islands.

Distribution in Puerto Rico and the Virgin Islands: Occurs mainly on calcareous or neutral soils at low to lower middle elevations (sea level to 450 m), often common in dry barren situations. Recorded from Arecibo, Bayamón, Cabo Rojo,

Corozal, Fajardo, Guánica, Lajas, Lares, Mona Island, Peñuelas, Ponce, Quebradillas, Vega Baja, Vieques, and Yauco; Anegada.

Common names: Puerto Rico: *Palma de escoba, Pandereta.*

Selected specimens examined: PUERTO RICO: Arecibo: Bosque de Río Abajo, *Acevedo-Rdgz. 294* (SJ). Bayamón: on mogotes near Bayamón, *Read 2058* (US-2). Cabo Rojo: Salinas de Cabo Rojo, *Sintenis 600* (US). Camuy to Quebradillas, *N.L. Britton & Cowell 1953* (US-2). Corozal: *N.L. Britton & E.G. Britton 7829* (US). Fajardo: *Sintenis 1324* (US). Guánica: *N.L. Britton & Shafer 1922* (US). Lares: *N.L. Britton et al. 2750* (US). Mona Island: *Otero & Chardon 911* (US). Ponce: Bo. Cañas, off Rd. 2 behind the Holiday Inn Hotel, *Acevedo-Rdgz. & Cedeño 7761* (NY, UPRRP, US-2). Vieques: Lighthouse Peninsula, *Shafer 2796* (US-2). Yauco: Susúa Forest Reserve, *Acevedo-Rdgz. 11413* (NY, UPRRP, US). Vega Alta: S of communication tower, *Acevedo-Rdgz. 12289* (US). Vega Baja: West of Vega Baja, *N.L. Britton et al. 6811* (US-2). ANEGADA: West End, *Fishlock 1062* (US-2). Along road from Pomato Point to West End, *Acevedo-Rdgz. 11048* (US). West side of Island, directly S of Cow Wreck Bay, *Acevedo-Rdgz. et al. 11574* (UPRRP, US).

CULTIVATED GENERA

The following taxa were listed by Britton & P. Wilson (1923) as being cultivated in Puerto Rico and/or the Virgin Islands.

Actinophloeus macarthurii (H. Wendl.) Becc., native to Australia, luxuriant in Puerto Rico gardens; *Areca catechu* L., Asiatic, planted in Puerto Rico and St. Thomas; *Areca madagascariensis* Mart., native of Madagascar, cultivated at the Mayagüez Agricultural Experiment Station; *Arenga saccharifera* Labill., East Indian, occasionally planted for ornament in Puerto Rico; *Borassus flabellifer* L., East Indian, recorded by West as found on St. Croix prior to 1793 and by Krebs on St. Thomas prior to 1851; *Butia capitata* (Mart.) Becc., from Brazil, grown at the Mayagüez Agricultural Experiment Station; *Caryota mitis* Lour., of Malaysian origin, cultivated at the St. Croix Agricultural Experiment Station in 1923; *Caryota urens* L., Asiatic, occasionally planted for ornament in Puerto Rico; *Corypha elata* Roxb., native of India, cultivated at the Mayagüez Agricultural Experiment Station; *Dictyosperma rubrum* H. Wendl. & Drude, East Indian, cultivated at the Mayagüez Agricultural Experiment Station; *Dypsis lutescens* (H. Wendl.) Beentje & J. Dransf. (*Chrysalidocarpus lutescens* H. Wendl.), from Madagascar, planted for ornament in Puerto Rico (San Juan); *Elaeis guineensis* Jacq., of African origin, cultivated at the Mayagüez Agricultural Experiment Station; *Howea belmoreana* (C. Moore & F. Muell.) Becc., native of Lord Howe's Island in the Pacific Ocean, occasionally planted in Puerto Rico; *Hyophorbe verschaffeltii* H. Wendl., of the Mascarene Islands, occasionally planted for ornament in the Virgin Islands; *Licuala grandis* H. Wendl., native of New Britain Island, occasionally grown for ornament in Puerto Rican gardens; *Livistona chinensis* R. Br., from China, planted for ornament in Puerto Rico and the Virgin Islands; *Martinezia caryotifolia* Kunth, from South America, cultivated at the Mayagüez Agricultural Experiment Station; *Phoenix dactylifera* L., from Africa, planted in Puerto Rico and the Virgin Islands; *Phoenix canariensis* Chabaud, of the Canary Islands, cultivated at the St. Croix Agricultural Experiment Station; *Phoenix reclinata* Jacq., native of Africa, occasionally planted in Puerto Rico and Virgin Islands gardens; *Phoenix rupicola* T. Anderson, East Indian, occasionally planted for ornament in Puerto Rico and St. Thomas; *Pritchardia pacifica* Seem. & H. Wendl., native of the Fiji Islands, planted for ornament in Puerto Rico gardens; *Rhapis excelsa* (Thunb.) A. Henry ex Rehder (*Rhapis flabelliformis* L'Hér.), native of western Asia, frequently grown for ornament in Puerto Rico gardens; *Rhopadostylis baueri* (Hook.) H. Wendl. & Drude, native of the Norfolk and Chatham Islands, cultivated at the St. Croix Agricultural Experiment Station; *Syagrus romanzoffiana* (Cham.) Glassman (*Cocos plumosa* Lodd. ex Hook.), native of Brazil, occasionally planted for ornament in Puerto Rico; *Washingtonia filifera* (Linden ex André) H. Wendl. (*Neowashingtonia filifera* (Linden ex André) Sud.), native of southern California, U.S.A., cultivated at St. Croix Agricultural Experiment Station; *Washingtonia robusta* H. Wendl. (*Neowashingtonia robusta* (H. Wendl.) Britton), native of southern California, U.S.A., occasionally

planted for ornament in Puerto Rico.

The following taxa were cited by Martorell et al. (1981) as being cultivated in Puerto Rico: *Archontophoenix cunninghamiana* (H. Wendl.) H. Wendl. & Drude, *Arecastrum romanzoffianum* (Cham.) Becc., *Arenga pinnata* (Wurmb) Merr., *Arikuryroba schizophylla* (Mart.) L. H. Bailey, *Astrocaryum standleyanum* L. H. Bailey, *Bactris gasipaes* Kunth, *Chamaedorea elegans* Mart., *Chrysalidocarpus madagascariensis* Becc., *Corypha umbraculifera* L., *Cryosophila warscewiczii* (H. Wendl.) Bartlett, *Dictyosperma album* (Bory) H. Wendl. & Drude ex Scheff., *Elaeis oleifera* (Kunth) Cortés ex Prain, *Latania loddigesii* Mart., *Phoenix roebelinii* O'Brien, *Phoenix sylvestris* (L.) Roxb., *Pinanga kuhlii* Blume, *Ptychosperma elegans* (R. Br.) Blume, *Ptychosperma macarthurii* (H. Wendl. ex H.J. Veitch) H. Wendl. ex Hook. f., *Raphia farinifera* (Gaertn.) Hyl., *Syagrus coronata* (Mart.) Becc., and *Veitchia merrillii* (Becc.) H. E. Moore.

Family 20. **COMMELINACEAE** *Spiderwort Family*

Commelinaceae R. Br., Prodr. 268. 1810, *nom. conserv.*

by G. R. Proctor

Annual or perennial herbs with erect or trailing sub-succulent stems; leaves alternate (rarely in a rosette), simple, parallel veined and usually entire, mostly with sheathing or clasping bases. Flowers usually bisexual, actinomorphic or zygomorphic, 3-merous, in terminal, axillary, or leaf-opposed cymes or umbels, these subtended by spathe-like or leafy bracts. Sepals usually free and distinct, green and herbaceous. Corolla delicate and soon-withering, blue, pink or white (in our species), of free, equal or unequal clawed petals, or else united in a short tube. Stamens most often 6, in two whorls of 3, or in some genera reduced in number; anthers 2-locular. Ovary superior, 2- or 3-locular; ovules 1 to several in each locule; sometimes only 1 or 2 locules fertile; style simple, terminal, with a capitate or 3-lobed stigma. Fruit a capsule or berry. A tropical to warm-temperate family of 30 genera and ca. 650 species. There are 7 genera represented by 14 species in Puerto Rico.

TYPE: *Commelina* L.

References: Faden, R. B. & Hunt, D. R., 1991. The classification of the Commelinaceae. Taxon 40: 19-31. Howard, R. A., 1979. Commelinaceae in Fl. Lesser Antill. 3: 427-448. Hunt, D. R., 1983. Commelinaceae in Fl. of Trinidad & Tobago 3 (3): 255-275. Tucker, G. C., 1989. The genera of Commelinaceae in the southeastern United States. J. Arnold Arbor. 70: 97-130.

Key to the genera

1. Fertile stamens usually 6; filaments mostly hairy. 2
   2. Inflorescences subtended by conspicuous, paired, foliaceous bracts ..... 6. *Tradescantia*
   2. Inflorescences subtended by solitary, inconspicuous, green bracts. 3
      3. Leaves entire: flowers white, actinomorphic; stamens all equal ..... 4. *Gibasis*
      3. Leaves finely serrulate; flowers pink (rarely white), zygomorphic; stamens dimorphic (3 long, 3 short) ..... 7. *Tripograndra*
1. Fertile stamens 1-3 (6 in *Callisia fragrans*), filaments glabrous. 4
   4. Flowers in dense sessile clusters ..... 2. *Callisia*
   4. Flowers obviously pedicellate and sometimes also with long peduncles. 5
      5. Flowers strongly zygomorphic, the larger petals 5-12 mm long, bright blue, pale blue, or white ..... 3. *Commelina*
      5. Flowers actinomorphic, very small (2 mm long or less) whitish or dull bluish. 6

6. Plants diffuse, weakly erect, the stems loosely pilose; leaves ovate to ovate-lanceolate, less than 4 cm long, abruptly narrowed at base ..... 1. *Aploleia*
6. Plants prostrate or nearly so, glabrous, forming mats; leaves linear or linear-lanceolate, up to 8 cm long, clasping stem at base ..... 5. *Murdannia*

1. APLOLEIA

Aploleia Raf., Fl. Tellur. 2: 17. 1837 ["1836"]

Weakly straggling herbs, the stems decumbent or ascending, much branched, the vegetative branches penetrating the sheaths at the nodes. Inflorescence terminal, open or diffuse, consisting of several or many pedunculate cymes arising from between minute paired bracts in the axils of ordinary or reduced leaves; peduncles always longer than the subtending leaves, terminating in small paired umbelliform cymes (cincinni). Flowers unequally long-pedicellate; sepals 2-3, herbaceous; petals 2-3, soon withering and deliquescent; stamens 1-3, opposite the sepals, the filaments glabrous, distinct, erect; anthers ovoid in bud, linear after dehiscence; ovary 2-3 locular with 2 ovules in each locule; style very short, with pedicellate stigma. A circum-Caribbean genus of two species, sometimes included in an expanded genus *Callisia*, to which it is alleged to be closely related.

TYPE: *Aploleia monandra* (Sw.) H. E. Moore (≡ *Tradescantia monandra* Sw.).

1. Aploleia monandra (Sw.) H. E. Moore, Baileya 9: 17. 1961; *Tradescantia monandra* Sw., Prodr. 57. 1788; *Callisia monandra* (Sw.) Schult. & Schult. f., Syst. Veg. 7. 1179. 1830. Type: Hispaniola. *Swartz s. n.* (holotype: S-Sw, #R-6170).

Callisia umbellulata Lam., Tabl. Enclycl. 1: 130, t. 35, f. 2. 1791. Type: South America. Lamarck, *Illus. 1: 130, t. 35, fig. 2. 1791.*

Figs. 33. A-E; 63. A

Stems weak, glandular-pilose chiefly on one side, rooting at nodes. Leaves subsessile, the blades ovate or ovate-lanceolate, 2-4 cm long, 1-2 cm broad, acuminate at apex, the margins ciliate. Peduncles filiform, 1-3 cm long; sepals elliptic-oblong, 1.6-2 × 0.9-1 mm, glandular-pilose or glabrous dorsally; petals lanceolate, smaller than the sepals, hyaline; stamens 1 or 2; ovary oblong-ellipsoid, compressed or angled, glabrous or pilose at apex; stigma 3-lobed. Capsule 1-1.3 mm long, apiculate.

General distribution: Mexico, Central America, northern South America, Greater Antilles (except Jamaica), Guadeloupe, and Martinique.

Distribution in Puerto Rico: Widespread in moist to wet districts and appears to prefer non-calcareous habitats, at medium to rather high elevations (100-1050 m). Recorded from Adjuntas, Aibonito, Arecibo, Barranquitas, Bayamón, Caguas, Cayey, Ciales, Jayuya, Las Marias, Maricao, Mayagüez, Naguabo, Patillas, Río Grande, Salinas, San Juan, Utuado, Villalba, Yabucoa, and Yauco.

Common name: Puerto Rico: *Cohítre morado.*

Selected specimens examined: PUERTO RICO: Adjuntas: Alto de la Bandera, *N.L. Britton & Shafer 2112* (US). Aibonito: Between Aibonito and Cayey, *Heller & Heller 525* (US). Arecibo: Río Abajo Forest Reserve, *Acevedo-Rdgz. & Angell 9379* (UPR, UPRRP, US). Barranquitas: Bo. Barrancas, *Proctor & Thomas 44442* (US). Bayamón: Bo. Santa Olaya, *Proctor 43190* (US). Cayey: along Rd 1, km 65, *Acevedo-Rdgz. 7911* (NY, UPRRP, US). Las Marias: La Juanita, near Las Marias, *N.L. Britton et al. 3927* (US). Maricao: Indiera Fría, *Acevedo-Rdgz. 4716* (F, K, MO, US). Mayagüez: 5 mi. NE of Mayagüez, *Heller 4452* (US). Naguabo: Sierra de Naguabo, Bo. Maizales, *N.L. Britton & Cowell 2176* (US). Patillas: Bo. Marín, *Proctor & Pinto 40288* (US). Río Grande: Sierra de Luquillo, Caribbean Natl. Forest, Road 191, km 9.9, at Quebrada Juan Diego, *Proctor 44486* (US). Utuado: *N.L. Britton & Cowell 988* (US). Villalba: Vicinity of Ala de la Piedra above Villalba, *N.L. Britton & Earle 6073* (US).

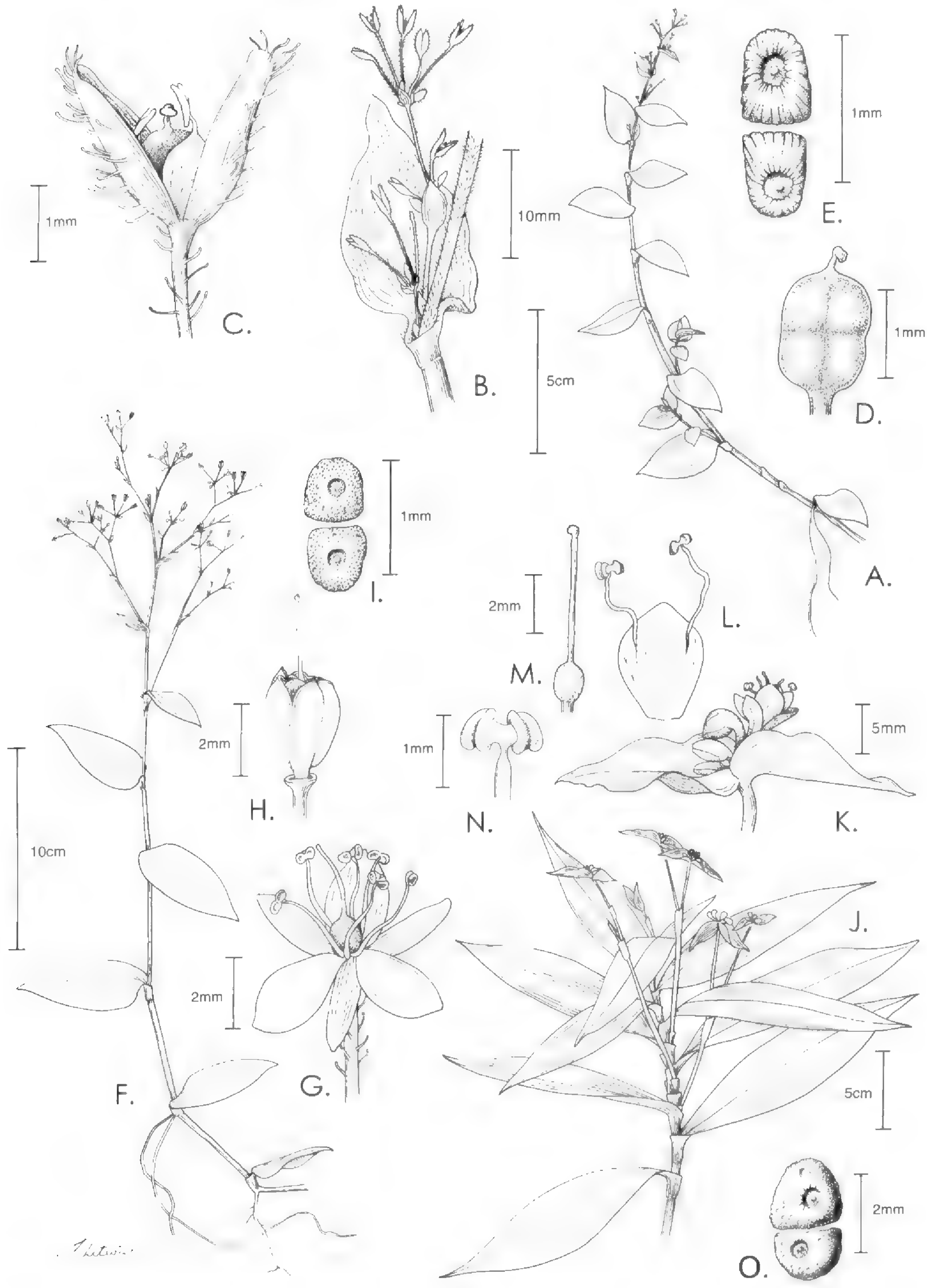


Fig. 33. A-E. *Aploleia monandra.* **A.** Habit. **B.** Inflorescence unit. **C.** Flower in fruit. **D.** Capsule. **E.** Seeds. **F-I.** *Gibasis geniculata.* **F.** Habit. **G.** Flower. **H.** Fruit. **I.** Seeds. **J-O.** *Tradescantia zanonia.* **J.** Habit. **K.** Inflorescence unit. **L.** Petal and stamens. **M.** Pistil. **N.** Upper portion of stamen showing anther. **O.** Seeds. (A, from *Liogier 30289* and *Proctor 40288;* B-E, from *Liogier 30289*; F, from *Proctor 41221*; G-I, from *Cedeño 583*; J, from *Proctor 49928*; K-O, from *Proctor 44154*).

2. CALLISIA

Callisia Loefl., Iter Hispan. 305. 1758.

Perennial creeping or ascending herbs, the stems slender to rather stout and succulent. Leaves pale to dark green, at least at the upper ones subsessile and vaginate, the blades ovate to elliptic-lanceolate or oblong-lanceolate. Flowers actinomorphic, bisexual, typically in sessile fascicles representing pairs of fused abbreviated cymes in the axils of leaves; the latter either normal in size and shape or else reduced to a vestige little more than a sheath. Sepals 2-3, subequal, usually hyaline, erect, persistent in fruit; petals 2-3, subequal, white or pink; marcescent; stamens 1-6, inserted opposite the petals, the filaments glabrous, anthers 2-locular, the locules rounded and separated by a band of sterile tissue; ovary oblong, sessile, 2- or 3-locular, each locule with 2 ovules; style long, with pedicellate or lobed stigma. Fruit a small capsule; seeds with punctiform hilum. A tropical American genus of 10 (Howard, 1979) to 20 species (Acevedo-Rodríguez, 1996).

NEOTYPE: *Callisia repens* (Jacq.) L. (≡ *Hapalanthus repens* Jacq.), designated by Britton & P. Wilson, Bot. Porto Rico 5: 147. 1923.

Key to the species of *Callisia*

1. Stems decumbent-ascending, succulent, 5-10 mm thick; leaves 8-28 cm long; flowers densely clustered at intervals on terminal racemiform or panicle-like inflorescence, ovary and capsule 3-locular ..... 1. *C. fragrans*
1. Stems prostrate, long creeping, very slender, 1-2 mm thick, leaves 1-4 cm long; flowers sessile in minute axillary paired cymules; ovary and capsule 2-locular ..... 2. *C. repens*

1. Callisia fragrans (Lindl.) Woodson, Ann. Missouri Bot. Gard. 29: 154. 1942; *Spironema fragrans* Lindl., Edward's Bot. Reg. 26: t. 47. 1840; *Rectanthera fragrans* (Lindl.) Deg, Fl. Hawaii 1: 62. 1932. Lectotype: Lindley, *Edward's Bot. Reg., 26: t. 47. 1840*, based on a cultivated plant originating from Mexico, designated by D.R. Hunt in Davidse et al., Fl. Mesoamer. 6: 168. 1994.

Fig. 34. A-E

Decumbent stoloniferous herb with elongate succulent stems rooting at the nodes, the flowering branches becoming ascending or sub-erect. Leaves spreading, oblong-lanceolate to narrowly elliptic, 8-25 (-28) cm long, 2.5-4.5 cm broad, sub-succulent, concave, the apex acute, the margins entire, the base slightly auriculate at the apex of the 1 cm tubular sheath. Flowers small, aggregated in dense sessile clusters at intervals along an apparently naked simple or branched inflorescence arising from a normal leafy stem. Bracts whitish, ovate or 3-lobed, to 1 cm long. Sepals oblong, boat-shaped, hyaline, 4-5.5 mm long; petals white to pinkish, oblong-lanceolate, 4.5-5.5 mm long; stamens 6, the filaments white, filiform, the anthers elliptic, basal on a butterfly shaped white connective 2 mm long; ovary 3-locular, sharply trigonous, the style to 4 mm long. Capsule 6-seeded.

General distribution: Endemic to Mexico, but widely cultivated and naturalized in tropical countries, e. g., Jamaica, Bonaire, Hawaii, and India.

Distribution in Puerto Rico and the Virgin Islands: Recorded as naturalized in Aguadilla, Camuy, Cayey, Ciales, Humacao, Maricao, and Toa Baja; St. Croix, St. John, Tortola, and Guana Island

Selected specimens examined: PUERTO RICO: Ciales: Bo. Frontón, *Proctor et al. 51148* (US). Humacao: *Liogier et al. 31317* (US). ST. CROIX: Cotton Valley, just back of Yellow cliff Bay, *Fosberg 53937* (US). ST. JOHN: Reef Bay Quarter; Fish Bay, *Acevedo-Rdgz. & Siaca 3870* (JBSD, MO, NY, UPR, US). TORTOLA: Belmont Estate, S of Belmont Pond, *Proctor 44414* (US).

2. Callisia repens (Jacq.) L., Sp. Pl. ed. 2, 62. 1762; *Hepalanthus repens* Jacq., Enum. Syst. Pl. 12. 1760. Type: Martinique. Jacquin, *Select, Stirp. Amer. Hist. t. 11. 1763.*

Prostrate, slender, creeping herb, the often purplish stems rooting at the nodes and often forming mats. Leaves ovate, 1-4 cm long; 1-2 cm broad, acute at apex, rounded to subcordate at base, sessile, sub-succulent, glabrous except for ciliate margins; pale green; sheath tubular, 3-3.5 mm long, with a few long hairs at apex. Flowering branches often somewhat ascending with leaves progressively smaller; flowers-clusters barely exserted beyond the sheaths in leaf-axils; bracts filiform, ciliate, 6-7 mm long. Sepals 3, linear-lanceolate, greenish, 2-5 mm long, minutely pubescent; petals 4, oblong, whitish hyaline, slightly shorter than or equaling the sepals; stamens exserted, typically 3, but may vary in number from 0 to 6; filaments minutely ribbon-like, coiled at first, to 10 mm long; anthers rounded-elliptic or elliptic, basal on a reniform white connective ca. 0.5 mm long. Ovary 2-locular, pilose at apex, style to 4.5 mm long, the stigma trifid (Howard, 1979) or penicillate (Hunt, 1983). Capsule lenticular, ca. 1.7 mm long, splitting from apex to base; seeds no more than 4.

General distribution: Southern United States (Texas, Louisiana, and Florida), Mexico, Central and South America, Cuba, Cayman Islands, Jamaica, Puerto Rico, Virgin Islands, and the Lesser Antilles.

Distribution in Puerto Rico and the Virgin Islands: Frequent in moist shady situations or sometimes on rocky bands, without any obvious soil preferences, at low to upper middle elevations (sea level to 830 m). It has been suggested that this species owes part of its present range to human introduction. It is sometimes planted in rock gardens and in hanging baskets. Recorded from Cabo Rojo, Coamo, Comerío, Culebra, Manatí, Mona Island, Río Grande, Salinas, Vega Baja, and Vieques; Guana Island, St. Croix, St. John, and Tortola.

Common names: Puerto Rico: *Belleza, Cohítre enano, Lenga de gallina.*

Note: Hunt (1963) gives the sepal length in Trinidad as 2-3 mm; Howard (1979) gives the sepal length in the Lesser Antilles as 3-4 mm; while Acevedo-Rodríguez (1996) gives the sepal length in St. John, Virgin Islands as 4-5 mm. These figures, if accurate, suggest a clinal change through the islands.

Selected specimens examined: PUERTO RICO: Cabo Rojo: Salinas de Cabo Rojo, *Sintenis 911* (US). Culebra: *N.L. Britton & Wheeler 35* (US). Salinas: Bo. Lapa, upper S slopes of Las Piedras Chiquitas, *Proctor & Liogier 42738* (US). Vieques: Sierra Encantada, *Shafer 2543* (US). ST. CROIX: Christiansted, Cane Bay Estate, *Rose et al. 3601* (US). pond 1 km NNW of Cathrine's Rest, on Granard Road, *Fosberg 54118* (US). Recovery Hill, *Ricksecker 412* (US). ST. JOHN: Bethany to Rosenberg, *N.L. Britton & Shafer 222* (NY, US); Road to Ajax Peak, *Acevedo-Rdgz. & Chinea 2651* (MO, NY, UPRRP, US, VINPS). TORTOLA: Belmont Estate, S of Belmont Pond, *Proctor 44413* (US). Great Mountain, *Fishlock 59* (US-2). Road Town to High Bush, *N.L. Britton & Shafer 746* (US).

3. COMMELINA

Commelina L., Sp. Pl. 40. 1753.

Perennial or annual herbs with fibrous or tuberous roots; stems decumbent to erect or sometimes rhizomatous and bearing cleistogamous flowers. Leaves sessile or short-petiolate. Inflorescence cymose, subtended by a spathe-like bract. Flowers zygomorphic, bisexual or polygamous (some flowers with stamens only); sepals 3, unequal, free or nearly so, the outermost one hood-shaped; petals 3, free, blue or white (in ours), very unequal, the lower one very small or minute (rarely lacking), the upper two clawed at base with conspicuous expanded apical portion; stamens 6, three of which are fertile, with ellipsoid or saddle-shaped anthers, the others (staminodes) with X-shaped anthers; all filaments glabrous. Ovary sessile, glabrous, 2- or 3-locular, with 1 or 2 ovules per locule. Fruit a dry dehiscent capsule; seeds smooth or variously marked, with a linear hilum. A cosmopolitan tropical and warm-temperate genus of 230 (Howard, 1979), 250 (G. C. Tucker, 1989) or 170 (Acevedo-Rodríguez, 1996) species. Whatever the correct figure, it is by far the largest taxon in the Commelinaceae.

LECTOTYPE: *Commelina communis* L., designated by Britton & A. Brown, Ill. Fl. N. U. S. ed. 2. 1: 457. 1913.

Key to the species of *Commelina*

1. Leaves finely pubescent, ovate with blunt apex; subterranean stolons present, bearing cleistogamous flowers ..... 1. *C. benghalensis*
1. Leaves usually glabrous, lanceolate, narrowly elliptic, or ovate-lanceolate, acute or acuminate at apex; stolons with cleistogamous flowers absent. 2
   2. Flowers white; fruits indehiscent; leaves up to 17 cm long ..... 4. *C. rufipes var. glabrata*
   2. Flowers blue or pale blue (rarely white); fruits dehiscent; leaves 3-10 cm long. 3
      3. Spathes free with ciliolate margins and without included mucilage; staminodes 2 ..... 2. *C. diffusa*
      3. Spathes closed toward base with included mucilage, the margins membranous, not ciliolate; staminodes 3 ..... 3. *C. erecta*

1. Commelina benghalensis L., Sp. Pl. 41. 1753, *nom. conserv.* Type: India. (holotype: Linn 65.16 (BM), *typ. conserv.*

Rhizomatous decumbent to sub-erect herb with basal leafless stolon-like branches bearing cleistogamous flowers. Aerial stems pubescent, up to 1 m long, rooting at lower nodes; petioles and sheaths ciliate with long pluricellular red hairs. Leaf blades 4-8 cm long, 1.5-3 cm broad, narrowed and inequilateral at base, freely pubescent on both surfaces. Spathes slightly funnel-shaped, auriculate on one side., 1-1.5 cm long, minutely pubescent, the margins joined toward the base. Sepals small, pubescent; petals orbicular, blue. Capsules 3-locular, 5-seeded: seeds minutely roughened and pitted.

General distribution: Tropical Asia, introduced in the United States (Florida, Georgia, Louisiana, and California), Cuba, Jamaica, Puerto Rico, Martinique, Montserrat, St. Vincent, and Barbados.

Distribution in Puerto Rico: Known from a single collection from Cayey.

Selected specimens examined: PUERTO RICO: Cayey: *Axelrod et. al. 730* (SJ, UPR).

2. Commelina diffusa Burm. f., Fl. Indica 18, t. 7, f. 2. 1768. Lectotype: India. *Burman s.n.* (G), designated by Merrill, J. Arnold Arbor. 18: 65. 1937.

Commelina longicaulis Jacq., Collectanea 3: 234. 1791 ["1789"]. Lectotype: Venezuela. Caracas, *Jacquin, Icon. Pl. Rar. 2: t. 294. 1797*, designated by R.A. Howard, Fl. Lesser Antill. 3: 432. 1979.

Commelina cayennensis Rich., Actes Soc. Hist. Nat. Paris 1: 106. 1792. Type: French Guiana. *LeBlond, s. n.* (holotype: probably at P).

Plants annual in areas with seasonal rainfall, long-persistent in areas or sites with constant moisture. Prostrate or ascending branched herb rooting at nodes. Leaves with scarious, ciliate sheaths, the blades lanceolate or ovate-lanceolate, acute or acuminate at apex, rounded at base. Peduncles very short or up to 5 cm long; spathes ovate-lanceolate, 1-2 cm long, acute or acuminate; cymes 1- to 3-flowered, polygamous; sepals 3-4 mm long, green, scarious on margins; upper two petals 4-5 mm long, bright blue; lower petal much smaller or absent. Capsules 3-locular, the upper locule with 1 seed, the other two with 2 seeds each, seeds black, reticulate.

General distribution: Pantropical.

Distribution in Puerto Rico and the Virgin Islands: A common weed of roadsides, moist ditches, and open waste land at low to high elevations (sea level to 1050 m). Recorded from Arecibo, Bayamón, Caguas, Cataño, Corozal, Guana Island, Guayama, Guayanilla, Manatí, Maunabo, Mayagüez, Naguabo, Naranjito, Patillas, Ponce, Río Grande, San Juan, Vega Baja, and Vieques; St. Croix, St. Thomas, and Tortola.

Common name: Puerto Rico: *Cohitre.*

Selected specimens examined: PUERTO RICO: Arecibo; Río Abajo State Forest, *Acevedo-Rdgz. 10602* (UPRRP). Bayamón: *Goll 211, 213* (US). Cataño: *Heller & Heller 115* (US). Guayama: Road from Guayama to Cayey, *Underwood & Griggs 447* (US). Guayanilla: Guayanilla to Tallaboa, *Shafer 1979* (US). Manatí: Road from Manatí to Vega Baja, *Underwood & Griggs 966* (US). Mayagüez: Road from Mayagüez to Joyuda, *Underwood & Griggs 139* (US). Ponce:

Juana Mata, *Goll 807* (US). Río Grande: Caribbean National Forest, Pico del Este, *Boom 7980* (US). San Juan: Río Piedras, *Hioram 912* (US). Vieques: Monte Pirata, *Axelrod et al. 4888* (US). St. Croix: Bassin, *Ricksecker 56b, 175, 403* (US). Christiansted, *Rose et al. 3576, 3591, 3592* (US). pond 1 km NNW of Catherine's Rest, on Granard Road, *Fosberg 54114* (US). Anna's Hope, *Thompson 100* (US). Cotton Valley, just back of Yellow cliff Bay, *Fosberg 53938, 53939* (US). East end of Concordia, scenic road, *Fosberg 54024* (US). Eliza's Retreat, Jakobsberg (Lang's Peak), *Fosberg & Hayes 54166* (US). North slope Altona-Langford Road, *Fosberg 54045* (US). Teague Bay, West Indies Lab campus, *Fosberg 53988, 60726* (US). Windsor Hill, Christiansted, *Seligson 278* (US). St. Thomas: *Raunkiaer s.n.* (US). *Kuntze s.n.* (US). *Eggers s.n.* (US). Sugar Estate, *Eggers 178* (US). Tortola: Beef Island, *N.L. Britton & Shafer 884* (US). Experiment Station, *Fishlock 237* (US).

3. Commelina erecta L., Sp. Pl. 41. 1753. Lectotype: Virginia. Dillenius, *Hort. Eltham. 94, p. 77, t. 88. 1732*, designated by C. B. Clarke in Alph. de Candolle & C. de Candolle, Monogr. Phan. 3: 181. 1881.

Commelina elegans Kunth in Humb., Bonpl., & Kunth, Nov. Gen. Sp. 1[quarto ed.]: 259. 1816. Type: Colombia. *Humboldt & Bonpland s.n.* (holotype: probably at P).

Commelina virginica sensu some authors, non L., 1763.

Fig. 34. F-I

Perennial herb with decumbent to erect stems arising from clustered, slender, tuberous roots; leaves lanceolate, mostly 3-9 cm long (rarely longer or shorter), 1-3 cm broad, the apex acute or acuminate, usually glabrous but sometimes minutely puberulous above. Inflorescences solitary or 2-4 clustered at top of stem; peduncles 0.7-2.2 cm long; spathes broadly ovate, sharply acuminate, mostly 2-3 cm long (sometimes slightly longer or shorter) glabrous or minutely puberulous; cymes 1 or 2 (usually only one fertile); flowers 1-3 (-6) per cyme; barely exserted beyond spathe, the pedicels ca. 3.5 mm long; sepals 4-5 mm long, whitish hyaline, the lower 2 connate; upper petals pale to deep blue (rarely white), 1-1.5 cm long (rarely longer). Fertile filaments curved, white; ovary ovoid-globose, the style elongate with minutely capitate stigma. Capsules 4-6 mm long, 3-locular, 1 locule warty, indehiscent, the other two smooth, dehiscent, with 1 seed in each locule; seeds smooth light brown, ca. 2.7 (-4) mm long.

General distribution: Southeastern United States and Mexico south to Argentina; also in tropical Africa.

Distribution in Puerto Rico and the Virgin Islands: Common in disturbed habitats and in dry to moist woodlands from low to high elevations (sea level to 1300 m). Recorded from Bayamón, Cabo Rojo, Cayey, Ciales, Coamo, Desecheo Island; Fajardo, Guayama, Manatí, Maricao, Mayagüez, Mona Island, Ponce, Río Grande, Salinas, Toa Alta, Vega Alta, Vega Baja, Vieques, andYabucoa; Anegada, George Dog, Great Camanoe, Guana Island, St. Croix, St. John, St. Thomas, Tortola, and Water Island.

Common name: Puerto Rico: *Cohítre azul.*

Selected specimens examined: Puerto Rico: Bayamón: *Goll 214* (US). Cayey: 7 mi. S of Caguas, *Heller & Heller 312* (US). Ciales: *Johnston 951* (US-2). Coamo: Coamo Springs, *Goll 643, 663, 671, 683* (US). Desecheo Island: *N.L. Britton et al. 1585* (US). Guayama: Guayama Road, *Goll 573* (US). Manatí: *Stevenson & Johnston 1975* (US). Mayagüez: *Sintenis 84* (US). Mona Island: vic. Cueva de Doña Gena, *Acevedo-Rdgz. & Siaca 4395* (FTG, NY, SJ, US). Ponce: Juana Mata, *Goll 803, 804, 810* (US). Salinas: Sabana Llana, *Goll 163, 164* (US). Toa Alta Road, Puente Flaco, *Goll 885* (US-2). Vega Baja: *Goll 1012* (US). Vieques: Isabel Segunda to Sierra Encantada, *Shafer 2516* (US). Yabucoa: Punta de la vaca, *Sintenis 5130* (US). Anegada: Area 1 km W of town, *Acevedo-Rdgz. et al. 11507* (US). St. Croix: Teague Bay, *Fosberg 60726* (US). St. John: East End Quarter, E of Southside Pond, *Acevedo-Rdgz. et al. 1832* (VINPS, NY, US). St. Thomas: Raphune hill, *Acevedo-Rdgz. 11224* (US, MAPR, UPRRP). Tortola: Beef Island, *N.L. Britton & Shafer 884* (US).

4. Commelina rufipes var. **glabrata** (D. R. Hunt) Faden & D. R. Hunt, Ann. Missouri Bot. Gard. 74: 122. 1987; *Commelinopsis glabrata* D. R. Hunt, Kew Bull. 36: 195. 1981. Type: Trinidad. *Broadway 6716* (K).

Tradescantia portoricensis Bello, Anales Soc. Esp. Hist. Nat. 12: 122. 1883. Type: Puerto Rico. *Bello s.n.* (destroyed).



Fig. 34. A-E. *Callisia fragrans.* **A.** Habit. **B.** Inflorescence unit. **C.** Flower. **D.** Stamen. **E.** Pistil. **F-I.** *Commelina erecta.* **F.** Flowering branch. **G.** Flower. **H.** Inflorescence with subtending bract. **I.** L.s. flower. **J-L.** *Tradescantia zebrina.* **J.** Habit. **K.** Flower, top view. **L.** Stamen. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

Athyrocarpus persicariifolius sensu Britton and P. Wilson, Bot. Porto Rico 5: 144. 1923, non *Commelinopsis persicariifolia* Delile, 1816.

Sprawling, decumbent to erect, sub succulent perennial herb, rooting freely at the lower nodes, the erect portions of stems up to 1 m tall. Leaves lanceolate or oblong-lanceolate, 8-19 cm long, 1.5-4 cm broad, acuminate at base, unequally cuneate at base, glabrous or nearly so; sheaths closed. Peduncles 1-4 at apex of stem, less than 1 cm long; spathes 2-4 cm long, broader than long, the margins free; cymes 2, the lower with (0)1-3 flowers, these staminate; upper cyme with 2-10 or more bisexual flowers; sepals 5 mm long; 2-3 mm broad; upper petals white, long-clawed; fertile stamens long, staminodes short. Capsules ellipsoid, 5.5-7 mm long, crustaceous, shining grayish white; anterior loculi 2-seeded; posterior loculus containing 1 large seed.

General distribution: Greater Antilles (except Jamaica), Grenada, Trinidad, and northern South America.

Distribution in Puerto Rico: Frequent on moist to wet forest slopes (mostly non-calcareous) at middle to upper middle elevations (100-830 m). Recorded from Aguada, Dorado, Las Marias, Luquillo, Maricao, Naguabo, Quebradillas, Río Grande, Salinas, Utuado, and Yabucoa.

Note: The closely related var. *rufipes* occurs only in South America. A large-leaved variant in Grenada and Trinidad has been suggested to be taxonomically distinct.

Selected specimens examined: PUERTO RICO: Dorado: grounds of Dorado Beach Hotel, *Maas 6464* (US). Las Marias: La Juanita, *N.L. Britton et al. 3911* (US). Maricao: coffee plantation, *Liogier 10773* (US). Río Grande: El Verde Research Station, *Boom 10059* (US). Río Grande: Sierra de Luquillo, Caribbean Natl. Forest, along W side of Río Mameyes, *Proctor 44484* (US). Utuado: Bo. Don Alonso, *Acevedo-Rdgz. 10534* (JBSD, MAPR, NY, UPRRP, US).

4. GIBASIS

Gibasis Raf., Fl. Tellur. 2: 16. 1837 ["1836"].

Annual or perennial herbs, the stems creeping, ascending, or tufted, the roots often with tubers. Leaves linear to ovate or oblanceolate, often pubescent or pilose with glandular hairs. Inflorescences terminal and in the axils of upper leaves, branched to form panicles or corymbs, these few- or many-flowered; bracts small but leaf-like. Flowers pedicellate, actinomorphic, bisexual, borne in abbreviated, ebracteate cincinni, aggregated in pairs or small umbels. Sepals and petals 3, free, the sepals persistent in fruit; stamens 6, all fertile or 3 fertile and 3 sterile; filaments usually pubescent and the anthers broadly triangular. Ovary 3-locular, with 2 ovules per locule; stigma minutely capitate. Capsules apically dehiscent with 3 valves; seeds rugose and with linear hilum. A genus of 6 species, widely distributed in tropical America except for one occurring in India. A single species is found in Puerto Rico.

TYPE: *Gibasis pulchella* (Kunth) Raf. (≡ *Tradescantia pulchella* Kunth).

1. Gibasis geniculata (Jacq.) Rohweder, Abh. Auslandsk., Reihe C. Naturwiss. 18: 143. 1956; *Tradescantia geniculata* Jacq., Enum. Syst. Pl. 18. 1760; ; *Aneilema geniculata* (Jacq.) Woodson, Ann. Missouri Bot. Gard. 29: 147. 1942. Lectotype: Martinique. Plumier (Burman ed.), *Pl. Amer., t. 116, fig. 2. 1757.*, designated by R.A. Howard, Fl. Lesser Antill. 3: 438. 1979.

Figs. 33. F-I; 63. B

Perennial, trailing-ascending, diffusely-branched herb, rooting at the decumbent lower nodes. Leaves ovate to ovate-lanceolate, mostly 3-7 × 1-3 cm, acute at apex, rounded to cordate at base, dark glossy green on upper side, often tinged purplish beneath, usually sparsely pubescent on both sides. Peduncles glabrous 2.5-5 cm long, the inflorescence loosely cymose or seemingly paniculate; pedicels filiform, 4-12 mm long; sepals lanceolate, green, 2-3 mm long, glabrous or nearly so; petals ovate, 3-5 mm long, white; filaments 2.5-3 mm long, villous toward base. Capsules 2-3 mm long; seeds 1 mm long, gray, obscurely rugose.

General distribution: widespread in the

Neotropics, but in the West Indies confined to Hispaniola, Puerto Rico, and the Lesser Antilles.

Distribution in Puerto Rico: Frequent in moist wooded sites at low to rather high elevations (25-1000 m). This species grow on both calcareous and non-calcareous soils. Recorded from Adjuntas, Aibonito, Arecibo, Caguas, Cayey, Ciales, Dorado, Fajardo, Florida, Guayama, Isabela, Jayuya, Luquillo, Maricao, Mayagüez, Naguabo, Salinas, San Juan, Utuado, Vega Alta, Yabucoa, and Vieques.

Common name: Puerto Rico: *Cohítre azul.*

Selected specimens examined: PUERTO RICO: Arecibo: Río Abajo State Forest, along Juan Ruiz trail, *Acevedo-Rdgz. 10686* (US). Ciales: along trail Camino de la Ceiba towards Quebrada del Pozo Azul, *Acevedo-Rdgz. & Vicens 11881* (MAPR, NY, UPRRP, US). Guayama: Bo. Carmen, *Proctor & Rivera 46940* (US). Maricao: Bosque Estatal de Maricao, *Acevedo-Rdgz. et al. 7696* (F, MO, NY, US). Naguabo: *Eggers 629* (US). Salinas: Bo. Lapa, *Proctor & Thomas 44153* (US). San Juan: Río Piedras, *Stevenson 208* (US). Utuado: Bo. Don Alonso, *Acevedo-Rdgz. et al. 13409* (US). Vega Alta: Bo. Sabana, *Proctor 42899* (US). Vieques: Sierra Encantada, *Shafer 2562* (US).

5. **MURDANNIA**

Murdannia Royle, Ill. Bot. Himal. Mts. 403, t. 95. f. 3. 1840, *nom. conserv.*

Annual or perennial prostrate or ascending herbs; stems often elongate and rooting at nodes; leaves various. Cymes aggregated in panicles or verticils, or else solitary; flowers zygomorphic; sepals 3, equal, free; petals 3, subequal, free, stamens 3-6. the outer whorl usually fertile, or consisting of one staminode, or absent; staminodes hastate or 3-lobed at apex. Capsules subequally 3-valved; seeds with punctiform or linear hilum. A tropical Asiatic and African genus of 50 species, a single one of which has become naturalized in the Neotropics.

TYPE: *Murdannia scapiflora* (Roxb.) Royle (≡ *Commelina scapiflora* Roxb.)

1. Murdannia nudiflora (L.) Brenan, Kew Bull. 7: 189. 1952; *Commelina nudiflora* L., Sp. Pl. 41. 1753. Lectotype: China or Java. *Osbeck 2* (LINN-65.12), designated by Merrill, J. Arnold Arbor. 18: 64. 1937.

Fig. 35. A-F

Prostrate or decumbent sub-succulent annual herb, rooting at nodes; leaves linear to narrowly lanceolate, usually glabrous, 3-13 × 0.1-0.9 cm, acute to subacuminate at apex, slightly clasping at the narrowed base. Inflorescences short- to long-pedunculate, the slender peduncles 2-15 cm long; cymes glabrous, usually solitary with ca. 5-8 flowers; pedicels to 3 mm long at anthesis, increasing to 4-5 mm long in fruit. Sepals 2 mm long; petals ca. 2 mm long; usually bluish or purplish pink; fertile stamens 2, the sterile ones 2-4; filaments bearded. Capsules 3-4 mm long, the valves apiculate, persistent.

General distribution: Tropical Asia and Africa, adventive as an aggressive weed at scattered localities in the Neotropics and in Florida.

Distribution in Puerto Rico: Weedy herb of wet open or disturbed situations from low to upper middle elevations (5-800 m), locally frequent. Apparently occurs only on acidic or non-calcareous soils. Recorded from Loíza, Luquillo, Naguabo, Río Grande, and Vega Alta.

Note: The flowers are said to open only between the hours of 11:00 a.m. to 1:00 p.m. (Hunt, Fl. Trin. & Tob., 1985).

Selected specimens examined: PUERTO RICO: Luquillo: Bo. Sabana, Caribbean Natl. Forest, along Río del Cristal, *Axelrod & Axelrod 7260* (US). Vega Alta: Bo. Sabana, Estáncias del Mar, *Proctor 46076* (US).

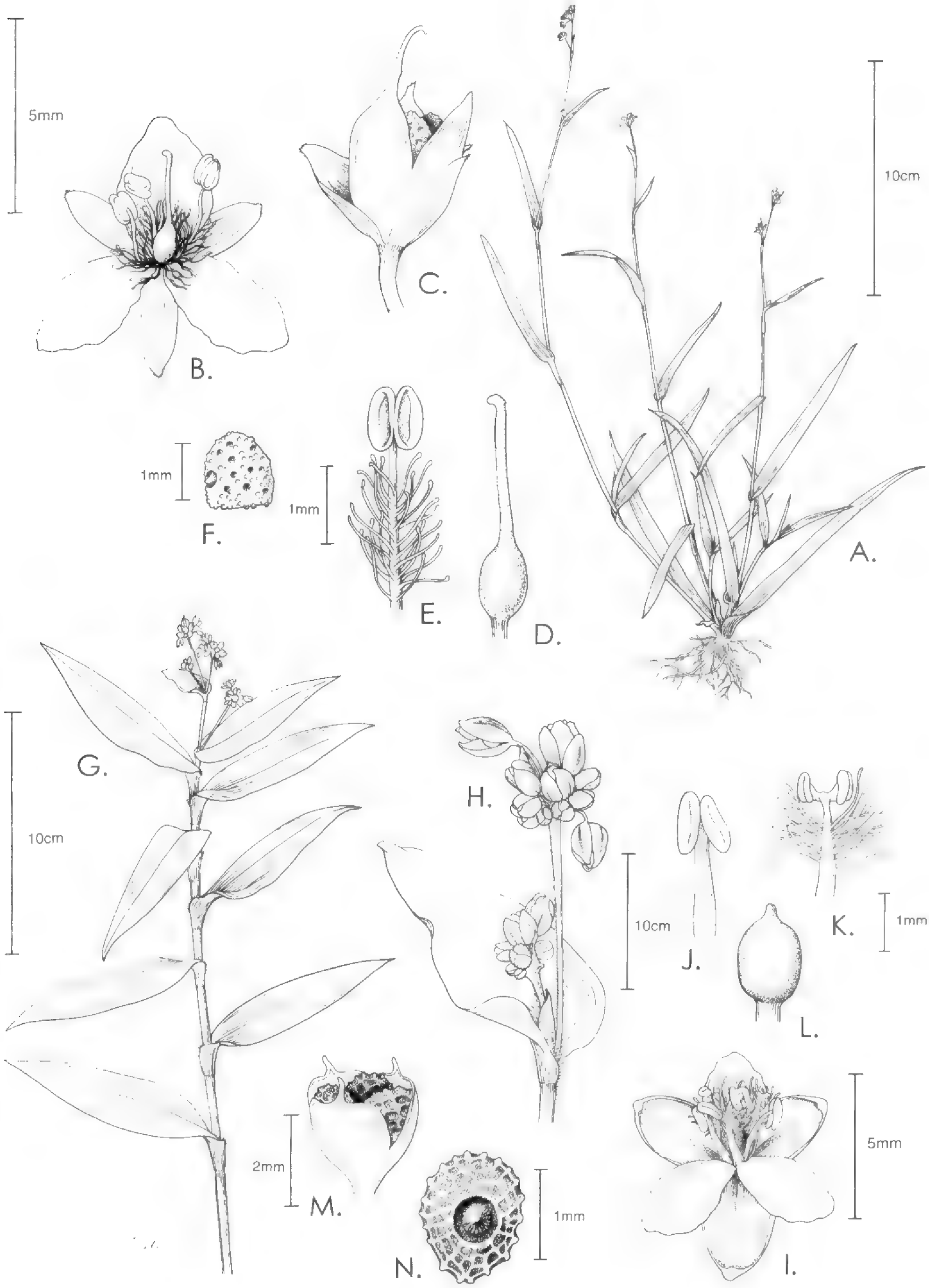


Fig. 35. A-F. *Murdannia nudiflora.* **A.** Habit. **B.** Flower. **C.** Capsule. **D.** Pistil. **E.** Stamen. **F.** Seed. **G-N.** *Tripogandra serrulata.* **G.** Habit. **H.** Inflorescence. **I.** Flower. **J.** Sterile stamen. **K.** Fertile stamen. **L.** Pistil. **M.** Capsule. **N.** Seed. (A, from *Proctor 46076*; B-F, from *Proctor 50169*; G-N, from *Proctor 49728*).

6. TRADESCANTIA

Tradescantia L., Sp. Pl. 288. 1753.

Perennial herbs of diverse habit, with fibrous or tuberous roots and simple or branched stems. Flowers bisexual, actinomorphic, in terminal or axillary umbel-like cymes subtended and often more or less enclosed by paired, sometimes boat-shaped bracts, these either similar to or strongly differentiated from ordinary leaves. Sepals 3, free, (rarely united), rarely accrescent and fleshy in fruit; petals 4, variously colored or white, usually free, sessile or sometimes clawed, rarely united into a slender tube; stamens 6, all similar, equal, and fertile or occasionally subequal; filaments glabrous or bearded, the anther-connectives broad, versatile, ovary 3-locular, with usually 2 ovules per locule; stigma minutely capitate. Capsules 3-valved; seeds rugose-reticulate, with usually a linear hilum. An American genus of more than 60 species occurring in both tropical and temperate areas. All the species recorded from Puerto Rico and the Virgin Islands are introduced ornamentals except for *T. zanonia*, and each one was formerly placed in a different genus. The introduced species have escaped from cultivation and have become more or less naturalized.

TYPE: *Tradescantia virginica* L.

Key to the species of *Tradescantia*

1. Stems elongate, creeping or decumbent-ascending; flowers pink to rose-purple. 2
   2. Leaves violet-glaucous, not striped; petals free ..... 1. *T. pallida*
   2. Leaves bicolorous with broad longitudinal stripes of green and silver on upper side, usually plain purplish beneath; petals united at base into a tube ..... 4. *T. zebrina*
1. Stems erect (occasionally or partly decumbent); flowers white. 3
   3. Stems concealed by a dense leaf-rosette; leaves usually purple beneath (rarely green); sepals pale green, remaining thin and membranous in fruit ..... 2. *T. spathacea*
   3. Stems evident, not concealed by leaves, up to 1 m tall; leaves pale green beneath; sepals becoming purplish black and fleshy in fruit ..... 3. *T. zanonia*

1. Tradescantia pallida (Rose) D. R. Hunt, Kew Bull. 30: 452. 1975; *Setcreasea pallida* Rose, Contr. U. S. Natl. Herb. 13: 294. 1911. Type: Mexico; Tamaulipas, near Victoria. *Palmer s. n.* (holotype: US!; isotype US!).

Setcreasea purpurea Boom, Acta Bot. Néerl. 4: 167. 1955. Type: Mexico. Sent by C.A. Purpus to Leyden where it was cultivated and later vouchered by *Boom 28046* (holotype: L).

Perennial herb with elongate decumbent-ascending stems with sub-erect flowering branches. Leaf sheaths clasping, 1-2.5 cm long, ciliate; blades oblong, 10-18 cm long, 2-3.5 cm broad, acute at apex, the upper one somewhat smaller. Inflorescences terminal and in upper leaf-axils; peduncles mostly 3-10 cm long; flowers in small densely cymose clusters subtended by 2 or 3 bracts, these similar to leaves but smaller; pedicels umbellate, to 7 mm long, pilose toward apex; sepals oblong, 8-10 mm long; petals pink to rose-purple, 15-20 mm long; stamens 6, with 3 filaments epipetalous and 3 adherent to petal margins, glabrous or variably pubescent. Fruit unknown, the plants always propagated by cuttings.

General distribution: Southern United States (Florida and Louisiana), Mexico and Central America; widely grown as an ornamental throughout the tropics.

Distribution in Puerto Rico and the Virgin Islands: Often seen in Puerto Rico as a cultivated plant, but voucher specimens not collected. In the Virgin Islands it has been collected on Guana Island, St. Croix, and St. Thomas as an escaped plant becoming naturalized.

Common name: Puerto Rico: *Cohitre morado.*

Selected specimens examined: ST. CROIX: West Indies Laboratory, Teague Bay, *Fosberg 55281* (US). ST. THOMAS: Hull Bay road, *Acevedo-Rdgz. 11354* (MAPR, US).

2. Tradescantia spathacea Sw., Prodr. 57. [June-July] 1788; *Rhoeo spathacea* (Sw.) Stearn, Baileya 5: 195. 1957. Type: Jamaica. *Swartz s.n.* (holotype: S-Sw, R-6172).

Tradescantia discolor L'Hér., Sert. Angl. 8, t. 12, [late 1788 or Jan] 1789; *Rhoeo discolor* (L'Hér.) Hance ex Walp. Ann. Bot. Syst. 3: 660. 1853. Type: L'Hériter, *Sert. Angl. t. 12, late 1788 or Jan 1789,* based on cultivated material.

Erect perennial sub-succulent herb with short stout erect stems to 20 cm tall, often clustered and forming large colonies. Leaves imbricate, crowded, sub-erect , linear-lanceolate to oblong-lanceolate, 20-35 cm long, mostly 3-5 cm broad, acuminate at apex, scarcely narrowed at base above the sheath, usually dark green above, red-purple beneath. Inflorescences axillary; peduncles 2-4.5 cm long, simple or branched; bracts deeply boat-shaped, broadly ovate, 2-4.5 cm long, 2.5-5 cm broad. Flowers numerous, scarcely exserted; pedicels ca 1.5 cm long, recurved in fruit; sepals ovate-lanceolate, 3-4 mm long; petals free, white, very broadly ovate, 5-8 × 5-7 mm broad. Stamens free; filaments 4-7 mm long, bearded toward base; ovary with 1 ovule in each locule. Seeds oblong-ellipsoid with linear hilum.

General distribution: Mexico to Guatemala and Belize; widely cultivated in tropical countries, easily escaping and often becoming naturalized. Found almost throughout the Greater and Lesser Antilles.

Distribution in Puerto Rico and the Virgin Islands: Recorded from Cataño, Manatí, Quebradillas, San Juan (cult.), and Yabucoa (cult.); St. John. This species occurs much more widely but voucher specimens are seldom collected.

Common names: Puerto Rico: *Sangría, Sanguinaria.*

Selected specimens examined: PUERTO RICO: Cataño: *Goll 971* (US). Manatí: *Stevenson 549* (US). Quebradillas: *Sargent B19* (US). San Juan: Río Piedras, *Stevenson s.n.* (US). Yabucoa: *Sintenis 5054* (US). ST. JOHN: On trail to Margaret Hill, *Acevedo-Rdgz. 2310* (US).

3. Tradescantia zanonia (L.) Sw., Fl. Ind. Occid. 1: 604. 1797; *Commelina zanonia* L., Sp. Pl. 41. 1753; *Campelia zanonia* (L.) Kunth in Humb. Bonpl. & Kunth, Nov. Gen. Sp. 1 [quarto ed.]: 264. 1816. Lectotype: French Guiana. *Plumier, Nov. Pl. Amer. T. 38. 1703,* designated by D.R. Hunt in Davidse et al., Fl. Mesoamer. 6: 161. 1994.

Fig. 33. J-O

Perennial herb with thick, succulent stems, these erect or partly decumbent, up to 1 m tall or more, often unbranched, exuding glutinous mucilage when broken. Leaves lanceolate to oblanceolate, 10-18 (-30) cm long, 3-5 (-8) cm broad, acuminate at apex, narrowed at base, dark green above, paler beneath, glabrous. Inflorescences axillary, the peduncles simple or branched, up to 20 cm long; bracts 2, often unequal, up to 3 (-6) cm long; pedicels up to 6 mm long; sepals 3-5 mm long, cucullate, accrescent and enclosing the mature fruit in a black, juicy envelope; petals free, broadly obovate-quadrate, 6-10 mm long, 5-8 mm broad, usually white; stamens free, filaments 4-8 mm long, glabrous or bearded; anther-connectives sagittate. Seeds black, smooth, lustrous, flat, with linear hilum.

General distribution: Continental Neotropics from Mexico to Brazil, including Trinidad and the Greater Antilles, but absent from the Lesser Antilles.

Distribution in Puerto Rico: Occurs in moist sheltered woodlands and thickets at middle to upper elevations (200-890 m). Recorded from Adjuntas, Arecibo, Cayey, Ciales, Coamo, Orocovis, Ponce, Salinas, Utuado, and Yauco.

Common name: Puerto Rico: *Cohítre blanco.*

Selected specimens examined: PUERTO RICO: Adjuntas: *Sintenis 4207* (US-2). Between Alto de la Bandera and Jayuya, *Cowell 5491* (US). Arecibo: Bo. Río Arriba, just SE of Río Abajo Forest Reserve boundary, *Axelrod & Ward 8819* (US). Ciales: Bo. Toro Negro, *Axelrod & Stenzel 11134* (US). Coamo: *Sintenis 3126* (US). Ponce: Bo. San Patricio, from S end of Rt. 515 along path of proposed Rt. 10, *Axelrod et al. 8965* (US). Salinas: Bo. Lapa, SE base of Las Tetas de Cayey, *Proctor 44154* (SJ). Yauco: Bo. Sierra Alta, *Proctor & Díaz 44741* (US).

4. Tradescantia zebrina Heynh., Alp. Aufz. Gew. 735. 1847. Type: Not known, based on material cultivated in Europe.

Zebrina pendula Schnizl., Bot. Zeit. 7: 870. Dec.

1849; *Tradescantia pendula* (Schnizl.) D. R. Hunt, Kew Bull. 36: 197. 1981. Type: Unknown.

Fig. 34. J-L

Decumbent, branched, long trailing sub-succulent herb, rooting at nodes, the stems glabrous or sometimes pilose. Leaves usually glabrous, broadly to narrowly or oblong-ovate, 3-8 cm long, 1.5-3.2 cm broad, acute to acuminate at apex, rounded-inequilateral at base, the sheaths villous, the upper broadly striped bluish green and silver, or the silvery portions replaced partly or wholly by purple, the underside uniformly reddish purple. Peduncles short to elongate, up to 12 cm long; flowers clustered between two unequal, imbricate, leaf-like bracts, the outer bract 2-5 cm long, the inner 1-2 cm long; pedicels to 3 mm; calyx white, 5-8 mm long, irregularly lobed, tubular toward base; corolla-tube white, 6-10 mm long, 1.3 mm in diam., the lobes ovate, 5-10 mm long, 3-7 mm broad, usually bright pink (rarely violet-blue); stamens epipetalous, subequal, the hairy filaments 3-5 mm long; ovary glabrous, 3-locular, with 2 ovules in each locule. Capsules dehiscent, gray-brown; seeds with punctiform hilum.

General distribution: United States (Florida, Louisiana, and Kentucky), Mexico and Central America; introduced and naturalized throughout the West Indies and South America.

Distribution in Puerto Rico and the Virgin Islands: Naturalized on shady banks and in moist secondary woodlands from near sea level to almost 900 meters. Recorded from Adjuntas, Aibonito, Arecibo, Arroyo, Bayamón, Carolina, Ciales, Lajas, Maricao, Morovis, Naguabo, Orocovis, San Germán, San Juan, Utuado, and Yauco; St. Croix, St. John, and Tortola.

Common names: Puerto Rico: *Cohítre morado, Judío errante.*

Selected specimens examined: PUERTO RICO: Adjuntas: *Sintenis 4153* (US). Aibonito: *Heller & Heller 892* (US). Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10589* (US). Ciales: Bo. Frontón, *Proctor et al. 51147* (US). Maricao: Monte Montoso, *N.L. Britton & Cowell 4150* (US). San Germán: *Sargent 58* (US). San Juan: Río Piedras, *Stevenson 1398* (US). ST. CROIX: Bassin, *Ricksecker s.n.* (US); *Ricksecker & Ricksecker 141* (US). ST. JOHN: Cruz Bay Quarter, Center Line Road, *Acevedo-Rdgz. & Siaca 4250* (US).

7. TRIPOGANDRA

Tripogandra Raf., Fl. Tellur. 2: 16. 1837 ["1836"].

Annual or perennial sub-succulent herbs with fibrous roots; stems simple or branched; trailing to erect, rarely scandent, often bearing long adventitious roots. Leaves with sheating bases, the blades linear to ovate. Inflorescences axillary, long pedunculate; flowers bisexual, zygomorphic, borne in small paired and fused cincinni not subtended by evident bracts but borne on a common peduncle, these double cincinni variously clustered or aggregated. Sepals 3, free; petals 3, free; stamens 6, dimorphic, the outer 3 shorter, the inner 3 longer; filaments glabrous or pilose, the longer filaments curved in order to be erect in front of the upper petal. Ovary 3-locular with 2 ovules in each locule; stigma more or less capitate. Capsules 3-locular, with 1 or 2 seeds in each locule; seeds original, reticulate, with punctiform or linear hilum. A Neotropical genus of about 20 species, one of which commonly occurs in Puerto Rico.

TYPE: *Tripogandra multiflora* Raf. (*Tradescantia multiflora* Jacq. 1790, non Sw. 1788).

1. **Tripogandra serrulata** (Vahl) Handlos, Baileya 17: 33. 1970. *Commelina serrulata* Vahl, Eclog. Amer. 2: 4. 1798. Type: probably from Montserrat. *Ryan s. n.* (holotype: C-Vahl).

Tradescantia elongata G. Mey., Prim. Fl. Esseq. 146. 1818. *Tripogandra elongata* (G. Mey.) Woodson, Ann. Missouri Bot. Gard. 29: 152. 1942. Type: Guyana. collector unknown (holotype: probably at GOET).

Figs. 35. G-N; 63. C

Perennial gregarious herb, the trailing lower stems purplish and rooting at nodes; flowering stems erect, up to 1 m tall or more, glabrous. Leaves lanceolate to oblong-lanceolate, or sometimes nearly ovate, 3-12 cm long, 1.5-3 cm broad, acute to acuminate at apex, narrowed and

slightly oblique at base, the margins minutely serrulate, the upper surface sometimes purple-streaked; sheaths ciliate. Inflorescences terminal and in the uppermost leaf-axils; peduncles up to 5 cm long, glabrous; pedicels 1-5 mm long; sepals elliptic, 3-5 mm long, glabrous; petals pink, pale pink, or rarely white, ovate-elliptic, 3.5-6 mm long, 2.3-4.3 mm broad; stamens with villous filaments, the anthers dimorphic. Capsules 3 mm long; seeds 1-1.5 mm long, gray or grayish brown, reticulate.

General distribution: Mexico, Central America, northern South America, Hispaniola, Puerto Rico, Guadeloupe, Dominica, Martinique, St. Vincent and Trinidad.

Distribution in Puerto Rico: Frequent in moist to wet, sheltered, non-calcareous habitats at low to upper middle elevations (near sea level to 700 m). Recorded from Adjuntas, Arecibo, Arroyo, Caguas, Ciales, Corozal, Maricao, Maunabo, Río Grande, San Juan, Trujillo Alto, and Utuado.

Selected specimens examined: PUERTO RICO: Adjuntas: 7 mi. N from Adjuntas, *Grant & Rundell 93-02295* (US). Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10676* (US). Maricao: Bosque Estatal de Maricao, *Acevedo-Rdgz. et al. 7697* (NY, US). Río Grande: *Acevedo-Rdgz. et al. 10760* (MAPR, UPRRP, US); Sierra de Luquillo, *Proctor & Thomas 44496* (US); Bo. Herreras, *Proctor & Thomas 45326* (US). San Juan: *Heller & Heller 662* (US).

Family 21. **HAEMODORACEAE** *Bloodroot Family*

Haemodoraceae R. Br., Prodr. 299. 1810, *nom. conserv.*

by G. R. Proctor

Perennial herbs with rhizomes or tubers, sometimes stoloniferous, the rhizomes often containing a red latex (colored by haemocorin, an arylphenalenone). Leaves linear or lance-linear, parallel-veined, all basal or sometimes distichous along erect stems, equitant, and sheathing at base, glabrous or pubescent. Inflorescences terminal on erect stems, cymose, in racemes or panicles; flowers regular, bisexual; perianth either 6-parted with separate parts, or 6-lobed above and tubular below, persistent; stamens 6 or 3 with free filaments; ovary inferior or superior, 3-locular, with few or many ovules; styles slender with small stigmas. Fruit a loculicidal 3-valved capsule; seeds few to many, tuberculate, hairy or glabrous, with abundant starchy endosperm. A family of 14 genera and ca. 80 species (Maas & Maas-van de Kamer, 1993), widely distributed in South Africa, Australia, and in temperate and tropical America.

TYPE: *Haemodorum* Sm.

References: Howard, R. A. 1979. Flora of the Lesser Antill. 3: 467-469. Maas, P. J. M. & H. Maas-van de Kamer. 1993. Fl. Neotrop. Monogr. 61: 1-44. Maas, P. J. M. & H. Maas-van de Kamer. 1993. Fl. Guianas, fasc. 15, 198. Haemodoraceae. Pp. 103-112.

1. XIPHIDIUM

Xiphidium Aubl., Hist. Pl. Guiane 33. 1775.

Stoloniferous herbs with creeping rhizomes and erect, sub-succulent, leafy stems. Leaves equitant, distichous, sheathed at base. Inflorescence terminal, paniculate with the flowers secund in two rows on the branches. Perianth 6-parted with spreading lobes. Stamens 3, with short filaments; anthers oblong; ovary superior, 3-locular, with numerous ovules; styles filiform with apical stigmas. Capsules subglobose, with numerous seeds. A Neotropical genus of 2 species, one (the type) widespread, the other endemic to western Cuba.

TYPE: *Xiphidium caeruleum* Aubl.

1. Xiphidium caeruleum Aubl., Hist. Pl. Guiane 33. 1775. Lectotype: French Guiana. Aublet, *Hist. Pl. Guiane t. 11, 1775*, designated by Maas & Maas-van de Kamer, Fl. Neotrop. Monogr. 61: 27. 1993.

Ixia xiphidium Loefl., Iter Hispan. 179. 1758; *Xiphidium floribundum* Sw., Prodr. 17. 1788; Fl. Ind. Occid. 1: 80. 1797, nom. Illeg.; *Xiphidium albidum* Lam., Tabl. Encycl. 1: 131. 1791, nom. Illeg. Type: Venezuela; Macarapa. *Loefling s. n.* (holotype: probably at LINN).

Figs. 36. A-H; 63. D

Rhizomes horizontally creeping, up to 20 cm long and 1 cm thick, bearing slender stolons up to 55 cm long, rooting at nodes; roots fibrous. Erect stems mostly 20-60 cm tall, sometimes taller. Leaves linear-lanceolate, glabrous, 45-60 cm long, mostly 1.5-5 cm wide (sometimes wider), acuminate at apex, clasping at base, the margins finely serrulate. Inflorescence a thyrse up to 30 cm long or more, the branches (cincinni) 5- to 25-flowered, simple or sometimes once-branched; main axis and branches minutely pubescent; pedicels 2-3 mm long; perianth-segments oblong-lanceolate, to 6.5 mm long, white to yellowish white, sometimes pale bluish within. Small deciduous plantlets sometimes produced in axils of inflorescence-bracts. Capsules 5-6 mm in diam., maturing shiny orange, then turning black; seeds many, black.

General distribution: Mexico, Central America, Greater and Lesser Antilles, Trinidad, and tropical South America.

Distribution in Puerto Rico and the Virgin Islands: Commonly cultivated as a garden plant, scaped and apparently naturalized in moist shaded banks and forest slopes at low to middle elevations (90-500 m). It is more widespread than the few collections indicate. Recorded from Caguas, Mayagüez, Río Grande, and San Germán. The only Virgin Islands record is from a cultivated plant collected in St. Thomas in 1923.

Common names: Puerto Rico: *Cola de paloma, Mano poderosa.*

Selected specimens examined: PUERTO RICO: Río Grande: Sierra de Luquillo, Caribbean Natl. Forest, along W side of Río Mameyes 0.2-0.5 km above road 988 bridge, *Proctor 44483* (US).

Family 22. **PONTEDERIACEAE** *Water-hyacinth Family*

Pontederiaceae Kunth in Humb., Bonpl., & Kunth, Nov. Gen. Sp. 1 [quarto ed.]: 265. 1816, *nom. conserv.*

by M. T. Strong & P. Acevedo-Rodríguez

Annual or perennial aquatic herbs of fresh water habitats, floating or rooted in mud, rhizomatous or stoloniferous, with sympodial branching. Stems usually short, often somewhat spongy or succulent. Leaves distichous, petiolate, the petioles vaginate, sheathing at base; stipules often present. Inflorescences terminal or pseudolateral, spicate, racemose, or paniculate, each subtended by a spathe-like leaf sheath. Flowers bisexual, actinomorphic or zygomorphic with a perianth of 6 imbricate segments, these free or basally connate. Stamens 3 or 6, rarely 1, inserted on the perianth, often unequal, with free filaments. Ovary superior, 3-locular with axile placentation or 1-locular with parietal placentation; ovules numerous or solitary; styles slender, the stigmas 3- to 5-lobed. Fruit a 3-valved capsule or indehiscent nutlet; seeds numerous, usually ribbed. A small pantropical family of 7 genera and ca. 30 species. Two genera are found in Puerto Rico.

TYPE: *Pontederia* L.

References: Barrett, S.C.H. 2004. Pontederiaceae. Pp. 474-476. *In:* Smith, N. et al. (eds.) Flowering Plants of the Neotropics, Princeton University Press, Princeton. Horn, C. 1994. Fam.197. Pontederiaceae. Pp. 91-102. *In:* Fl. Guianas, fasc. 15. Horn, C. 2002. Fam. 220. Pontederiaceae. Pp. 37-46. *In:* Flora of North America Editorial Committee (eds.), Fl. North Amer., vol. 26.

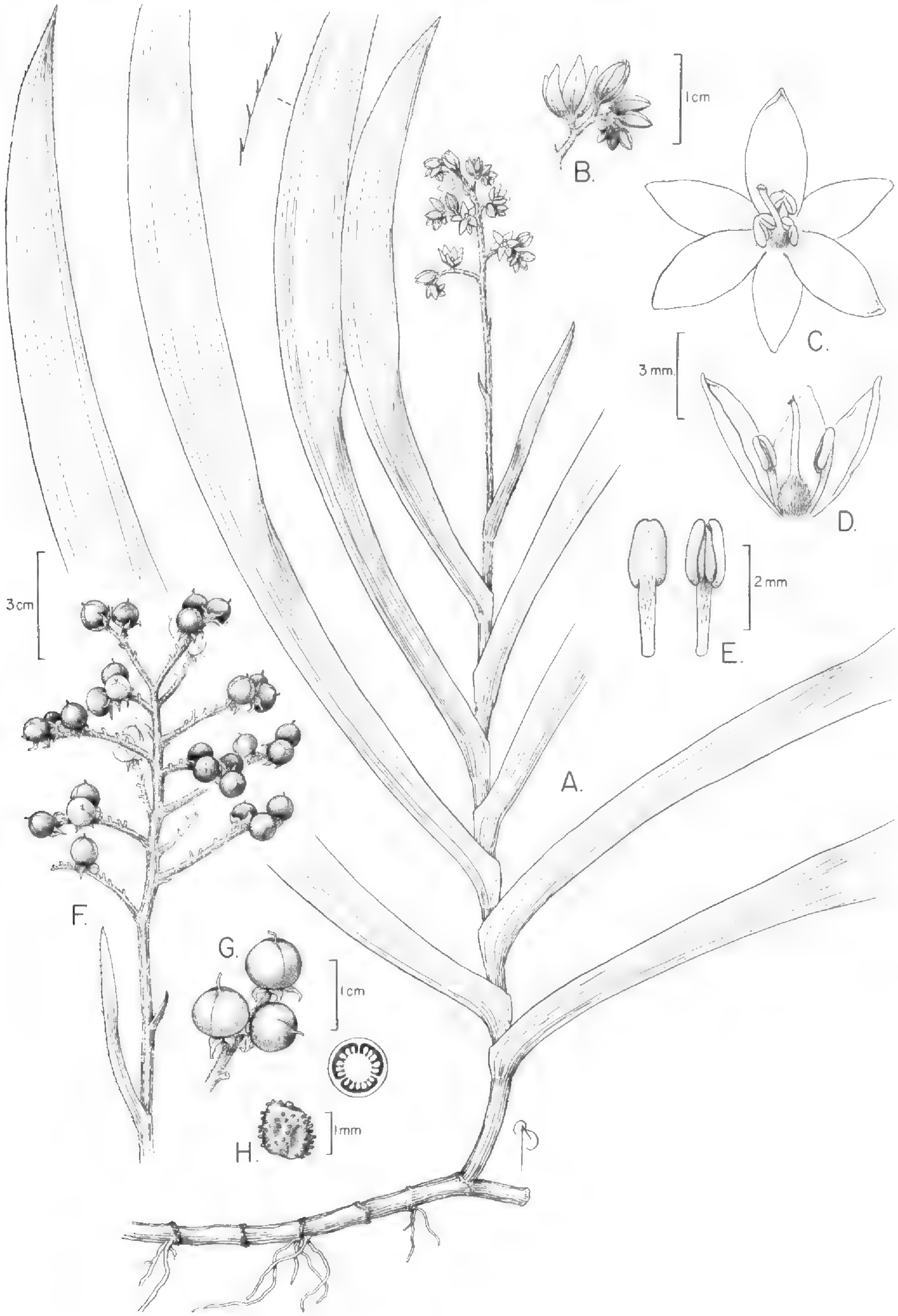


Fig. 36. A-H. *Xiphidium caeruleum.* **A.** Plant with inflorescence and detail of leaf margin. **B.** Part of inflorescence. **C.** Top view of flower. **D.** Lateral view of flower with three tepals removed. **E.** Dorsal and frontal views of stamens. **F.** Infructescence. **G.** Part of infructescence and transverse section of fruit. **H.** Seed. From Mori, S. et al. 1997. Vascular plants of central French Guiana. Mem. NYBG Vol. 76(1).

Key to the genera

1. Flowers blue or violet, showy in one species; stamens 6; petioles sometimes swollen ..... 1. *Eichhornia*
1. Flowers white or blue, small; stamens 3; petioles not swollen ..... 2. *Heteranthera*

1. EICHHORNIA

Eichhornia Kunth, Eichhornia. 1842, *nom. conserv.*

Floating or rooted herbs. Leaves often with swollen petioles and usually with broadly expanded blades (some forms outside our area may have linear submerged leaves). Inflorescences apparently terminal, the flowers in spikes, racemes or panicles. Flowers with perianth segments in two series, united below, often large and showy; stamens 6, irregularly adnate to the perianth, 3 of them exserted and 3 included; filaments flattened at the base; ovary 3-locular with numerous ovules. Fruit a capsule included in the withered perianth. Seven species distributed in the Neotropics, one in Africa.

TYPE: *Eichhornia azurea* (Sw.) Kunth (≡ *Pontederia azurea* Sw.), *typ. conserv.*

Key to the species of *Eichhornia*

1. Plant floating; leaves in a basal pseudo-rosette, petioles usually swollen; inflorescence 4- to 15-flowered, to 15 cm long; flowers with central distal lobe with a dark blotch in center and yellow spot within blotch ..... 1. *E. crassipes*
1. Plant rooted; leaves produced at intervals along stem, not in a basal pseudo-rosette, petioles not swollen; inflorescence 2- to 4-flowered, 2-5 cm long; flowers with lobes lacking a blotch with yellow spot ..... 2. *E. diversifolia*

1. Eichhornia crassipes (Mart.) Solms in Alph. de Candolle & C. de Candolle, Monogr. Phan. 4: 527. 1883; *Pontederia crassipes* Mart., Nov. Gen. Sp. Pl. 1: 9, t. 4. 1823; *Piaropus mesomelas* Raf., Fl. Tellur. 2: 81. 1837, *nom. illeg.* Lectotype: Brazil; Bahia. *Martius 60* (M), designated by C.N. Horn in Görts-van Rijn, Fl. Guianas fasc. 15, Fam. 197. Pontederiaceae: 94. 1994.

Fig. 63. E

Aquatic perennial, typically free-floating or sometimes rooting in mud. Flowering stems to 25 cm long, erect, often bending over after flowering. Leaves in a basal pseudo-rosette, the petiolate ones floating or emersed; leaf petioles inflated below the middle, or at least slightly swollen, 3.5-35 cm long; blades of petiolate leaves leathery, ovate, orbicular or reniform, 2.5-16 × 3.5-14 cm, flat or concave-convex, the apex short-cuspidate, acuminate or rounded at base. Inflorescence spicate, densely or sub loosely 4- to 15-flowered, to 15 cm long; spathes obovate, 4-11 cm long; peduncle 5-12.5 cm long, glabrous. Flowers opening individually within 2 hours after sunrise, wilting by night; perianth blue or mauve-blue, limb lobes obovate, 1.6-4 × 1.5-2.5 cm, margins entire, central distal lobe with dark blotch in center and yellow spot within blotch; perianth tube 1.5-2 cm long, pubescent with glandular-tipped hairs; anthers 1.7-2.1 mm long; ovary 3-6 mm long, glabrous; style ca. 2 cm long, 3-lobed, pilose. Capsule 1.5 cm long; seeds columnar, 1.1-2.1 × 0.6-0.9 mm, horizontally striate, 11- to 14-winged.

General distribution: Introduced in the tropics and subtropics worldwide, native to Northern South America.

Distribution in Puerto Rico and the Virgin Islands: Floating in water of lakes, ponds, and streams. Recorded from Coamo, Lajas, Loíza, Mayagüez, Rincón, San Juan, Utuado, and Yauco; St. Croix.

Common names: Puerto Rico: *Flor de agua, Jacinto de agua.*

Selected specimens examined: PUERTO RICO: Coamo: Coamo Dam, *Liogier et al. 29454* (US). Lajas: Laguna Cartagena, *Caudales s.n.* (UPR). Loíza: Vacia Talega area, *Woodbury et al. s.n.* (UPR). Mayagüez: *Sintenis 489* (US). Rincón: Cayures, *Caudales s.n.* (UPR). San Juan: Río Piedras, *Stevenson 1104* (US). Utuado: Dos Bocas, *Caudales s.n.* (UPR). Yauco: Río Yauco,

Barinas, *Caudales s.n.* (UPR). St. Croix: Katherine's Rest, *Ricksecker 19, 99* (US).

2. **Eichhornia diversifolia** (Vahl) Urb., Symb. Antill. 4: 147. 1903; *Heteranthera diversifolia* Vahl, Enum. Pl. 2: 44. 1805; *Piaropus diversifolius* (Vahl) P. Wilson in Britton & P. Wilson, Bot. Porto Rico 5: 149. 1923. Type: French. Guiana. *L.C. Richard s.n.* (holotype: C).

Aquatic annual, rooted in mud. Stems elongate, slender, floating. Flowering stems 1.5-3 cm long, erect. Leaves produced at intervals along stem, not in a basal pseudo-rosette, dimorphic, the sessile ones with linear blades, 3-7 cm × 2-4 mm, acuminate at apex, the petiolate blades rounded to cordate, 1.3-3.2 × 0.6-4 cm, with obtuse to acute apex and a cordate base; leaf petioles not inflated, 2-7 cm long. Inflorescence a spike, 2- to 4-flowered, 2-5 cm long (from base of spathe); spathes linear, 1.3-1.9 cm long; peduncles 0.9-1.9 cm long, glabrous. Flowers all opening the same day; perianth blue to purplish blue or lavender, the tube 8-15 mm long, yellowish within (fide Stahl watercolor), the lobes 4-10 (-12) × 3-4.5 mm, the upper one often with a pale yellow spot; stamens of two different lengths, the upper 2.5-6 mm long, the lower 5.1-7.6 mm long; anthers 0.7-1.3 mm long; ovary ellipsoid, 1-4 × 3 mm, glabrous; style 1.5 cm long, the stigma capitate, homostylous, pilose. Capsule 6-10 mm long; seeds cylindric, 0.4.1 × 0.2-0.5 mm, longitudinally 9- to 12-winged, brown.

General distribution: Central America, Greater Antilles, and South America.

Distribution in Puerto Rico: In lakes and streams. Known from a single collection of *Woodbury s.n.* and a botanical illustration prepared by Agustin Stahl in the 1880's.

Common name: Puerto Rico: *Flor de agua.*

Selected specimens examined: Puerto Rico: No locality or date given, *Woodbury s.n.* (UPR).

Excluded Species

Liogier & Martorell (1982) cite *Eichhornia azurea* (Sw.) Kunth as occurring in a pond near Cayey, Puerto Rico. However, no specimens have been seen to confirm this record nor has it been recently collected there.

2. HETERANTHERA

Heteranthera Ruiz & Pav., Fl. Peruv. Prodr. 9. 1794, *nom. conserv.*

Annual or perennial herbs, rooting in mud. Leaves sessile or petiolate, those at base sessile, forming a rosette, the blades linear or sometimes oblanceolate, acuminate to obtuse at apex; petiolate leaves emersed or floating, the blade reniform, cordate, or oblong, membranous, acute to obtuse at apex. Inflorescences spicate or solitary, 1- to 30-flowered; spathes folded or clasping, with acute to caudate apex. Flowers with perianth segments connate ½ or more of their length, yellow, blue-mauve, mauve, or white, tubular or salverform, limb actinomorphic or zygomorphic, the lobes linear to oblanceolate or narrowly elliptic, obtuse to acuminate at apex; stamens 3, unequal, 2 lateral ones usually shorter; filaments yellow or purple, inflated in some species, glabrous, glandular-pubescent, or pilose; anthers yellow or purple, rounded, oblong, or sagittate; ovary incompletely 3-locular; ovules 10-many; style 3-lobed. Fruit an elongate capsule; seeds 10-200, ovoid, testa with longitudinal wings. Twelve species distributed in the Americas and Africa.

TYPE: *Heteranthera reniformis* Ruiz & Pav.

Reference: Horn, C. N. 1985. A systematic revision of the genus *Heteranthera* (sensu lato; Pontederiaceae). Ph.D. Dissertation, University of Alabama. 260 pp.

Key to the species of *Heteranthera*

1. Petiolate leaves emersed, erect, the blades ovate to elliptic or elliptic-lanceolate, cuneate to truncate at base; inflorescence 1-flowered; perianth blue or white, actinomorphic ..... 1. *Heteranthera limosa*
2. Petiolate leaves floating, or if emersed weakly ascending, the blades round-reniform; inflorescence 2- to 8-flowered; perianth white, zygomorphic ..... 2. *Heteranthera reniformis*

1. **Heteranthera limosa** (Sw.) Willd., Ges. Naturf. Freunde Berlin, Neue Schriften 3: 439. 1801; *Pontederia limosa* Sw., Prodr. 57. 1788. Type: Jamaica. *Swartz s.n.* (lectotype: S-Sw, R-5197; isolectotype: C). here designated*.

Plant annual, emersed and rooting in shallow water. Flowering stems erect, 2–24 cm long. Leaves strongly ascending to erect, forming a basal rosette, the petiolate ones emersed; leaf petioles stout at base, gradually narrowed distally, 2–14 cm long; blades of petiolate leaves ovate to elliptic or elliptic-lanceolate, 1–5.5 cm × 4–33 mm, acute to broadly so at apex, truncate to cuneate at base. Inflorescences 1-flowered, 4-6 cm long; spathes 0.9–4.5 cm long, glabrous. Flower opening within 1 hour after dawn, wilting by midday; perianth blue or white, salverform, limbs essentially actinomorphic, lobes equal, narrowly elliptic, 5.2–16 × 3–3.5 mm, the distal lobes yellow toward base; perianth tube 15–44 mm long, essentially glabrous; stamens unequal, lateral stamens 2.3–7.8 mm long, central stamen 3.3–7.2 mm long, the filaments linear, glandular-pubescent; style glabrous. Capsule linear-oblong or narrowly ovoid-ellipsoid, 12-23 × 2.5-5.5 mm; seeds 0.5–0.8 × 0.2–0.6 mm, longitudinally 9– to 14–winged, grayish brown.

General distribution: United States, Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico: Known only from a single collection made in a roadside ditch; Mayagüez.

Note: *The lectotype specimens designated here follow those chosen by Horn (1985) but were not validly published (see reference above for *Heteranthera*).

Selected specimens examined: Puerto Rico: Mayagüez: About 5 km N of Mayagüez, *Caudales 33256* (UPR).

2. **Heteranthera reniformis** Ruiz & Pav., Fl. Peruv. 1: 43. 1798. Type: Peru. *Ruiz & Pavón s.n.* (lectotype: MA; isolectotypes: B, BM, K), here designated*.

Plant annual or facultatively perennial, trailing and rooting at the nodes in mud or floating in shallow water. Flowering stems 1–9 cm long, often deflexed. Leaves strongly ascending to erect, forming a basal rosette, the petiolate ones floating or emersed; leaf petioles stout, 1–15 cm long; blades of petiolate leaves round-reniform, 1–4 × 1–7.5 cm, the apex obtuse, cordate at base. Inflorescences spicate, sub loosely 2– to 8-flowered, to 5 cm long; spathes folded, 0.8–5.5 cm long, glabrous; peduncle 0.5–4.2 cm long, glabrous. Flowers opening ca. 3 hours after sunrise, wilting by early afternoon; perianth white, salverform, limbs zygomorphic, lobes narrowly elliptic, 3–6.5 mm long, distal central lobe with yellow or green region at base, sometimes with distal brown spot; perianth tube 6–10 mm long, densely glandular-pubescent; stamens unequal, lateral stamens 0.9–2.2 mm long, the filaments linear, pubescent with white multicellular hairs toward apex; central stamen 2.2–4.7 mm long, the filament sparsely pubescent; style pubescent with multicellular hairs. Capsule narrowly ellipsoid-oblong, 8-12 mm long, 2-3 mm in diam., acute and short-beaked; seeds oblong-ellipsoid, 0.5–0.9 × 0.3–0.5 mm, 8– to 14-winged, light brown.

General distribution: Eastern United States, Mexico, Central America; scattered in South America (Argentina, Brazil, Paraguay); naturalized in Italy.

Distribution in Puerto Rico and the Virgin Islands: Wet mud of streams and roadside ditches. Widely distributed, although seldom collected.

Note: *The lectotype specimens designated here follow those chosen by Horn (1985) but were not validly published (see reference above for *Heteranthera*).

Selected specimens examined: Puerto Rico: Carolina: Bo. Cangrejo Arriba, in small park opposite jct. Of Road 187 extension w/Highway 26 (Ave. Baldorioty de Castro), *Proctor 45228* (US). Humacao: Bo. Punta Santiago, beside Hwy 3 at Río Antón Ruiz bridge, *Proctor 44204* (US).

Cultivated Species

Pontederia cordata L (Fig. 63. F) is sometimes cultivated in ponds and aquatic gardens in Puerto Rico.

Family 23. **MUSACEAE** *Banana Family*

Musaceae Juss, Gen. Pl. 61. 1789, *nom. conserv.*

by P. Acevedo-Rodríguez

Large perennial herbs with a massive sympodial corm and adventitious root systems, monocarpic (in *Ensete*) or suckering (in *Musa*). Leaves large, spirally arranged, with large, broad, entire blades and stout, long petioles with closely-overlapping basal sheath, forming a pseudostem. Inflorescence terminal, and usually pendulous, with spirally arranged, keeled, leathery, colorful bracts enclosing a few-flowered, axillary monochasial cyme. Flowers zygomorphic, functionally unisexual or less often bisexual (in *Ensete*), pistillate flowers subtended by the lower bracts, staminate ones by the upper bracts; sepals 3, petaloid, adnate to 2 petals to form a tubular structure that soon splits along one side, the remaining petal free. Stamens 5 or 6, the 6th one usually staminodial, anthers linear. Ovary inferior, 3-locular, with numerous axile ovules per locule, style terminal, the stigma 3-lobed, papillate. Fruit a fleshy capsule with separable exocarp. Seeds stony, few to numerous, operculate, without an aril. A palaeotropical family of two genera and ca. 42 species. The common cultivated banana or plantain are sterile triploid that produce no seeds.

TYPE: *Musa* L.

References: Purseglove, J.W. 1972. Tropical Crops: Monocotyledons. Longman. 607 pp. Ríos, P.G. 1930. Cultivo del banano en Puerto Rico. Ins. Agric. Exp. Sta. Río Piedras Bull. 36: 1-58. Simmonds, N.W. 1982. Bananas, 2nd edition. Longman, London.

Note: The Musaceae is partially treated in this work because of the ubiquitous presence of *Musa* cultivars on the islands. They are propagated by asexual means and have only been recorded as persistent (not naturalized) in secondary forests and abandoned farms.

1. MUSA

Musa L., Sp. Pl. 1043. 1753.

Characters as given for the family. *Musa* are predominantly clumped perennial herbs with unisexual flowers. About 35 species are naturally distributed in the Old World tropics. *Musa* is cultivated as a source of fibers, ornamental plants, and most importantly as a food crop. Cultivation of *Musa* sterile diploids or triploids (*bananas* and *plantains*) constitutes a major crop throughout tropical and subtropical regions of the world. Traditionally, the cultivated bananas are referred to *Musa sapientum* L. while the plantains to *M. paradisiaca* L. as if they were real species. The use of these binomials is confusing since they have been applied indiscriminately to wild species and numerous cultivars alike. Both names are typified by triploid hybrids (AAB) and may be applied only to clones that resemble them. The usage of these binomials are of little value and therefore should be abandoned in favor of a system that describes the cultivar's genome. Banana and plantain cultivars have been derived from two main species, *Musa acuminata* Colla (AA) and *Musa balbisiana* Colla (BB), through parthenocarpy, interspecies crossing, and polyploidy. A more precise way to refer to these cultivars would be by groups of letters describing their genome (Simmonds, 1982). The following cultivars are known to occur in Puerto Rico.

1. **AA group**. A sterile diploid commonly known as *Guineito, Datil*, or *Niño*.
2. **AAA group**. Includes the *Guineo gigante* or *Guarán*, the *Monte cristo*, the *Monte cristo enano*, the *Guineo enano*, the *Morado* or *Colorado*, and the *Morado verde* or *Colorado blanco*.
3. **AAB group** (Fig. 63. H). Includes the *Manzano* (the type of *Musa sapientum*), the *Plátano común, Cuarenteno, Jartón,* or *Maricongo*, the *Plátano enano*, and the *Plátano congo* (the type of *Musa paradisiaca*).
4. **ABB group** (Fig. 63. G). Includes the *Chamaluco, Piche, Mafafo, Malango, Cuatrofilos,* or *Forrongo,* the *Chamaluco enano*, and the *Cenizo*.

The fertile species *Musa velutina* H. Wendl. & Drude is sometimes grown as an ornamental plant. This species usually reaches 1-1.5 m tall and has an erect inflorescence with rosy fruits that produce seeds.

Family 24. **HELICONIACEA**E *Heliconia Family*

Heliconiaceae Nakai, J. Jap. Bot. 17. 201. 1941.

by G. R. Proctor

Large perennial rhizomatous herbs with erect pseudostems and distichous, petiolate leaves with broad simple blades. Inflorescence terminal, erect or recurved and pendulous with distichous, colored bracts enclosing axillary glomerate or cincinnate flowers. Flowers bisexual; sepals 3, two of them adnate at base of the corolla, the third sepal free and larger; petals united into a tube, 3-toothed at the apex; fertile stamens 5, with linear anthers, the single staminode short and petaloid; ovary inferior, 3-locular, with one basal ovule in each locule, style filiform, the stigma clavate or capitate and 3-lobed. Fruit a capsule or drupe-like, separating into 3 cocci or dehiscent, usually blue or black. Seeds stony, grayish, without an aril. A primarily Neotropical family of one genus and more than 100 species, all of them occurring in Central and South America and the West Indies except 6 species and several varieties indigenous to islands of the southwest Pacific area from Samoa to Indonesia. The Neotropical species are pollinated by hummingbirds, while those of the Pacific islands are pollinated by nectar-feeding bats.

TYPE: *Heliconia* L.

Reference: Berry, F. & W. J. Kress. 1992. *Heliconia*: an identification guide. Smithsonian Institution Press. 334 pp.

1. HELICONIA

Heliconia L., Mant. Pl. 2: 147, 211. 1771, *nom. conserv.*

Characters as given for the family. Distribution and notes as given above for the family.

TYPE: *Heliconia bihai* (L.) L. (≡ *Musa bihai* L.)

Key to the species of *Heliconia*

1. Inflorescence pendulous ..... 4. *H. rostrata*
1. Inflorescence erect. 2
    2. Plants mostly ca. 1 m tall, rarely to 1.5 m. 3
        3. Bracts ascending at an angle of 10°-45° to the rachis; flowers orange with black tips ..... 3. *H. psittacorum*
        3. Bracts nearly horizontal; flowers yellow to green, not black-tipped (sometimes white-tipped) ..... [*H. acuminata*]
2. Plants usually 2 m tall or more. 4
    4. Bracts yellow, or yellow variously flushed with red, deeply boat-shaped with bases overlapping ..... 2. *H. caribaea*
    4. Bracts crimson or deep red, sometimes green-margined towards the apex, narrowly boat-shaped, not overlapping at bases. 5
        5. Bracts more or less spirally arranged; bracteoles soon decaying into a fibrous mass; floral tube more than 10 mm long ..... 1. *H. bihai*
        5. Bracts distichous; bracteoles not decaying into a fibrous mass; floral tube less than 5 mm long ..... 5. *H. stricta*

1. Heliconia bihai (L.) L., Mant. Pl. 2: 211. 1771; *Musa bihai* L., Sp. Pl. 1043. 1753; *Bihai bihai* (L.) Griggs, Bull. Torrey Bot. Club 31: 445. 1904, nom. inadmiss. Neotype: Surinam (LINN-286.1), designated by L. Andersson, Nordic J. Bot. 1: 765, 769. 1981.

Plants 1.5 m tall. Petioles variable, up to 2 m long; leaf blades narrowly oblong, up to 2 m long, and 20 cm or more wide, glaucous when young, but often becoming green on both surfaces; apex cuspidate-acuminate, the base rounded to acute. Inflorescence erect with a short peduncle; bracts shallowly boat-shaped, 2.5-4 cm wide, narrowly triangular, succulent, the middle ones ca. 13 cm long or more, widely separated and never overlapping at the base, usually scarlet, crimson, or dusky red, often with the upper margins yellow; flowers with perianth 3 cm long, the sepals and petals white-tipped. Fruits bright blue.

General distribution: Hispaniola, Puerto Rico, Lesser Antilles, and northern South America.

Distribution in Puerto Rico: Recorded from Luquillo, Río Grande, Santa Isabel, Trujillo Alto, and Utuado; this species is very rare in Puerto Rico.

Selected specimens examined: PUERTO RICO: Luquillo: Bo. Sabana, Rt. 988, *Axelrod et al. 12548* (UPRRP-2). Santa Isabel: Santa Isabel, Bo. Felicia 2, Paso Seco, *Pomales 12* (UPRRP). Utuado: Bo. Caniaco, *Acevedo-Rdgz. & Chinea 11808* (US).

2. Heliconia caribaea Lam., Encycl. 1: 426. 1785. Type: Martinique. Plumier (Burman ed.), *Pl. Amer., t. 59. 1756.*

Heliconia borinquena Griggs, Bull. Torrey Bot. Club 30: 658. 1903; *Bihai borinquena* (Griggs) Griggs, Bull. Torrey Bot. Club 31: 445. 1904. Type: Puerto Rico. *Underwood & Griggs 363* (holotype: US!; isotype: NY!).

Bihai bihai of Britton & P. Wilson, 1924, non *Musa bihai* L., 1753.

Figs. 37. A-E; 63. I

Plants 3-6 m tall. Petioles up to 2 m long; leaf blades oblong or elliptic-oblong, up to 1 m long or more, 20-35 cm wide, green on upper side, usually more or less glaucous beneath, abruptly short-acuminate at the apex, the base acute or rounded. Inflorescence erect with short peduncle, 30-50 cm long, of heavy texture; bracts deeply boat-shaped, acute to long-acuminate, 6-15 cm long, closely overlapping at base, yellow, often variously flushed with red with a yellow edge; flowers ca. 3 cm long, green or greenish yellow with sepals and petals green-tipped. Ripe fruits deep blue.

General distribution: Greater and Lesser Antilles.

Distribution in Puerto Rico and the Virgin Islands: Frequent in humid ravines and on moist or wet hillsides at low to middle elevations (50-700 m). Recorded from Barranquitas, Bayamón, Caguas, Cayey, Fajardo, Guayama, Las Piedras, Luquillo, Naguabo, Patillas, Río Grande, and Yauco; Tortola.

Common names: Puerto Rico: *Botecitos, Guineo cimarrón, Guineo silvestre, Pámpano, Plátano de indio.*

Selected specimens examined: PUERTO RICO: Barranquitas: *Sargent 682* (US). Bayamón: *Sintenis 1131* (US). Fajardo: Río Arriba, *N.L. Britton & Shafer 1684* (US). Naguabo: Sierra de Naguabo, *Shafer 3352* (US-2). Río Grande: Sierra de Luquillo, *Eggers 1278* (US). TORTOLA: Sage Mountain, *Fishlock 467* (US).

3. Heliconia psittacorum L. f., Suppl. Pl. 158. 1782. Lectotype: Surinam. *Dahlberg 13* (LINN-286.4), designated by L. Andersson, Opera Bot. 82: 50, 51. 1985.

Stoloniferous herb usually ca. 1 m tall, growing in dense clumps. Leaves several, petiolate, the blades narrowly oblong, divaricate, up to 40 cm long, 5-10 cm wide, green, the apex acuminate, the base rounded to subcordate, often oblique. Inflorescence erect, long-pedunculate, the peduncle 15-55 cm long, slender, 2-3 mm thick, glabrous; bracts 3-6, usually orange-yellow, distichous, moderately spaced, 3-6 cm long, 1 cm wide. Flowers ca. 4.5 cm long, yellow-orange, the segments tipped with black. Ripe fruits subglobose, to 9 mm in diam., variously colored yellow, orange, bluish, or black.

General distribution: Native to the Lesser Antilles and tropical South America; commonly cultivated as an ornamental in gardens and beside houses in most tropical countries, where it tends to persist or become naturalized.

Distribution in Puerto Rico & Virgin Islands:

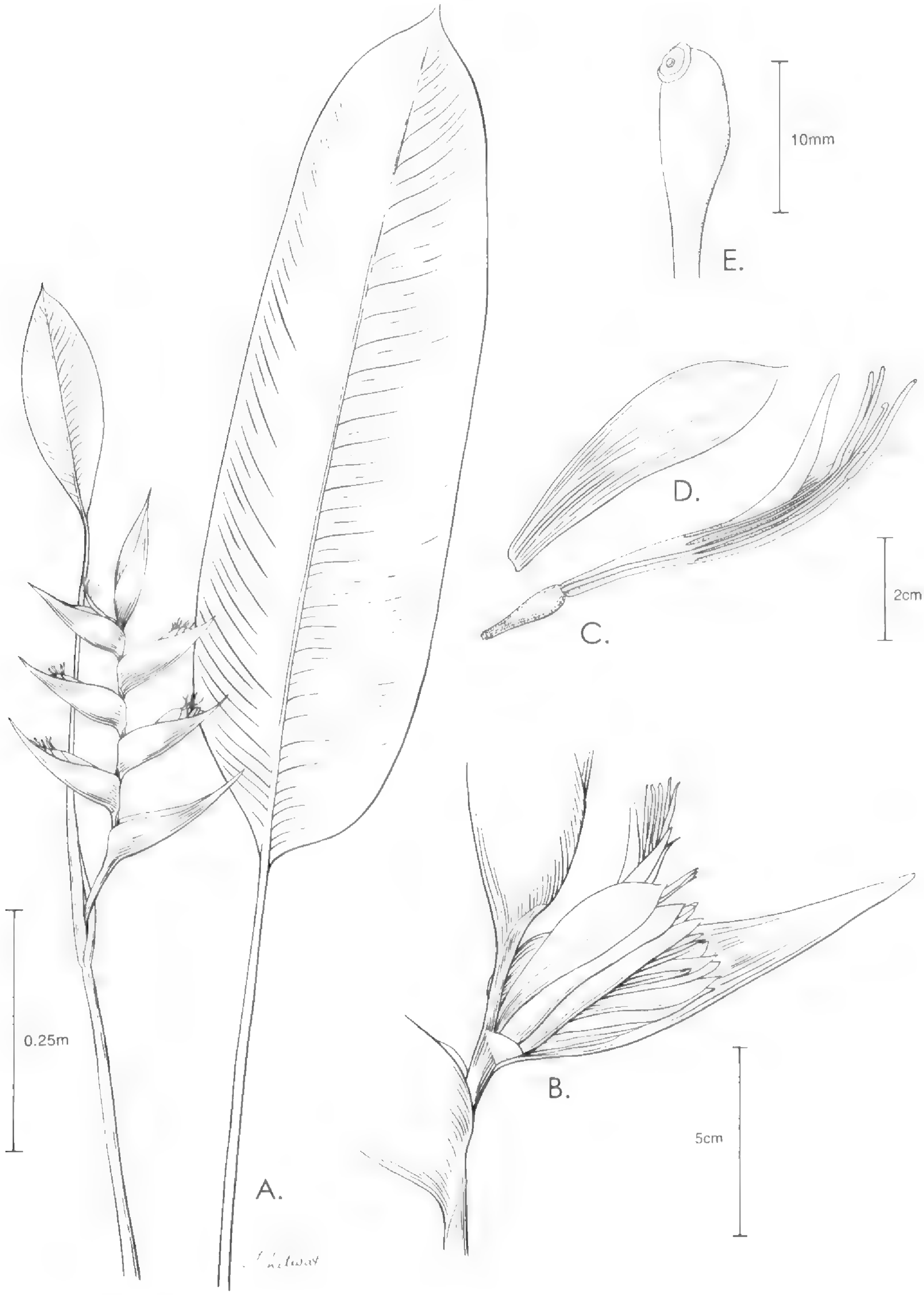


Fig. 37. A-E. *Heliconia caribaea.* **A.** Inflorescence and leaf. **B.** L.s. bract showing flowers. **C.** Flower. **D.** Sepal. **E.** Capsule. (A, from *Proctor 44647*; B-E, from *Proctor 44728*).

Recorded as a naturalized plant from Arecibo, Cayey, Río Grande, and San Juan. In the Virgin Islands recorded under cultivation on Guana Island

Note: This species also has a number of horticultural variants, and it hybridizes with other species. The hybrid *H. psittacorum* × *spathocircinata* cv. "Golden Torch" has been recorded in Puerto Rico under cultivation in Ciales and Río Grande.

Selected specimens examined: PUERTO RICO: Arecibo: Bosque de Río Abajo, Camp Radley, *Acevedo-Rdgz. 274* (SJ); Río Abajo State Forest, *Proctor 43014* (US). San Juan: Río Piedras, Jardín Botánico University of Puerto Rico, *Acevedo-Rdgz. & Serrano 7907; 7909; 7910* (US). ST. THOMAS: Crown Mountain, *Acevedo-Rdgz. 11215* (US).

4. Heliconia rostrata Ruiz & Pav., Fl. Peruv. 3: 71. 1802; *Bihai rostrata* (Ruiz & Pav.) Griggs, Bull. Torrey Bot. Club 31: 445. 1904. Lectotype: Peru; Huánuco, *Pavón s. n.* (MA), designated by L. Andersson in G. Harling and L. Andersson, Fl. Ecuador, 221. Musaceae, 57. 1985.

Erect herb usually 3-5 m tall; leafy shoots in groups of 8 to 29; pseudostem green, glabrous, 1.25-2 m tall, 3.4-4.5 cm thick; leaves 6 to 19 per shoot; petioles 20-30 × 1.1-1.4 cm; blades oblong, the longest 100-125 × 15-28 cm, the apex acute to acuminate, the base usually truncate, the surfaces green and glabrous. Inflorescence pendent, to 70 cm long; peduncle green to deep red, scurfy to puberulous, 6-20 cm long, 1-1.1 cm thick; rachis flexuous, red, scurfy to minutely puberulous, 0.7-1 cm thick, the bracts spaced 1.2-1.5 cm apart. Fertile bracts distichous or spirally arranged, 14-33 per inflorescence, 7-8.2 cm long, 3-4 cm wide at base, narrowed apically from the distal side to form a blunt, beak-like point, the whole bract red with a broad yellow margin distally and apically. Flowers ca. 19 per fertile bract; perianth 4.5-5.4 cm long, white to pale yellow at base, yellow distally. Stamens with anthers usually connivent within apex of corolla-tubes; ovary white to pale yellow, glabrous, 6-8 mm long. Ripe fruits blue, 9-12 mm long, 5-8 mm in diam.

General distribution: Venezuela, Colombia, Ecuador, Peru and Bolivia; widely cultivated elsewhere because of its handsome inflorescences.

Distribution in Puerto Rico: Recorded from Río Grande, in the Caribbean National Forest, Sierra de Luquillo, from a roadside collection, perhaps planted or persistent after cultivation.

Selected specimens examined: PUERTO RICO: Río Grande: Caribbean National Forest, Rt. 191, *Rodríguez & Vélez 46* (UPRRP).

5. Heliconia stricta Huber, Bol. Mus. Paraense Hist. Nat. 4: 543. 1906. Lectotype: Peru; Loreto. *Huber 2038* (MG), designated by L. Andersson, Nordic J. Bot. 1: 778. 1981.
Heliconia humilis of authors, non *Musa humilis* Aublet, 1775.

Plants slender to rather stout, (0.75-) 1-3 (-4) m tall. Petioles slender, 25-90 cm long; leaf blades ovate to obovate, or oblong, 28-75 × 7-20 cm, sharply acuminate at the apex, obtuse to acute or shortly attenuate at the base, green on both sides. Inflorescence erect, sessile or with a short peduncle up to 8.5 cm long, glabrous; bracts rather few (3-9), stout, distichous, rather deeply boat-shaped, dark red with greenish or yellowish green margins, overlapping at base and strongly ascending, the lowermost much the longest, 10-26 cm long, long-acuminate at the apex. Flowers white at the base and apex, the middle part dark green, 5-5.5 cm long, glabrous. Fruits not described.

General distribution: Tropical western South America, extending eastward to Manaus in the Amazon basin and in the north to Surinam.

Distribution in Puerto Rico: In swamps and wet forests. Recorded as a cultivated plant in the Jardín Botánico, Río Piedras and as naturalized in Río Grande, Bo. Jiménez in the Sierra de Luquillo, in disturbed secondary rain-forest at 210-240 m elevation.

Selected specimens examined: PUERTO RICO: Río Piedras: Jardín Botánico University of Puerto Rico, *Acevedo-Rdgz. & Serrano 7908* (US).

Cultivated Species

The following additional species of *Heliconia* have been noted under cultivation in Puerto Rico: *Heliconia acuminata* Rich. (Bo. Tejas, Las Piedras, no voucher) *H. irrasa* R. R. Sm. (San Juan: Río Piedras, Jardín Botánico, *Acevedo-Rdgz. & Serrano 7906*, US-2; *7903*, US), *Heliconia*

latispatha Benth. (Río Grande: Caribbean National Forest, in front of forest headquarters, *Acevedo-Rdgz. 11197*, US-2. San Juan: Río Piedras, Jardín Botánico, *Acevedo-Rdgz. & Serrano 7905*, US-2), *Heliconia marginata* (Griggs) Pittier (for descriptive information about this species see Howard, F1. Lesser Antill. 3: 522. 1979), *Heliconia platystachys* Baker (Río Piedras: Jardín Botánico University of Puerto Rico, *Acevedo-Rdgz. & Serrano 7902,* NY, UPRRP, US), and *Heliconia subulata* Ruiz & Pav.

Family 25. **ZINGIBERACEAE** *Zingiber Family*

Zingiberaceae Adans., Fam. Pl. 2: 61. 1763, *nom. conserv.*

by M. T. Strong & P. Acevedo-Rodríguez

Rhizomatous perennials, usually aromatic herbs; rhizomes well-developed, often horizontal and creeping, generally rich in starch. Stems usually short, the leaf sheaths forming elongate pseudostems above. Leaves distichous, primarily cauline, the basal ones often reduced to bladeless sheaths; sheaths elongate, usually open or sometimes closed; ligule present, membranous; petioles present or absent; blades lanceolate, oblanceolate, oblong, or linear, acuminate or obtuse at apex, the venation pinnate with a prominent midvein and secondary lateral veins which are parallel or arching. Inflorescence a terminal spike or thyrse; involucral bracts often scale-like, spirally-arranged. Flowers bisexual, zygomorphic, epigynous, the perianth in 2 whorls of 3; calyx tubular or spathe-like, sometimes split on one side, 3-lobed or -toothed, green or colorless; corolla fused basally into a tube, 3-lobed, generally longer than the calyx, white, yellow, or red; androecium composed of an outer whorl of 2 lateral tooth- to petal-like staminodes and a reduced median staminode and an inner whorl composed of a single fertile stamen subtended by several lateral, connate, often petaloid staminodes which form a petaloid labellum (lip). Nectar glands occur at the base of the floral tube surrounding the style base, or else are sunken in the apex of the ovary. Ovary inferior, 3-carpellate, (1-) 3-locular, the locules all fertile; placentation parietal, axile, or ± basal; ovules several to many per locule, anatropous; placentation, axile, parietal, or basal; style entire, straight, linear-filiform, clasped by the thecae of the anther; stigma funnelform, sometimes slightly 2-lobed, papillate, the margin often ciliate. Fruit a dry loculicidally dehiscent capsule or fleshy and berry-like and indehiscent, the sepals often persistent at base. Seeds hard, operculate, with a thin lobate or laciniate aril; embryo linear. A pantropical family of approximately 50 genera and 1400 species with its center of distribution in southeast Asia (with 80-90% of the taxa). The only indigenous genus in Puerto Rico is *Renealmia*, but several other taxa have been introduced, with some of the species more or less naturalized.

TYPE: *Zingiber* Mill.

Reference: Wu Delin & Kai Larsen. 2000. Zingiberaceae. Pp. 322-377. *In:* Wu Zhengy & P. H. Raven, eds., Flora of China, Vol. 24, Flagellariaceae through Marantaceae, Science Press, Beijing, China and Missouri Botanical Garden Press, St. Louis, U.S.A.

Key to the genera

1. Inflorescence cone-like, the bracts closely imbricate. 2
   2. Inflorescence terminating a long, leafy stem, the leaves with well-developed blades ..... 3. *Hedychium*
   2. Inflorescence terminating a long or short stem with sheaths or scale-like cataphylls only, lacking well-developed leaf blades 3
      3. Inflorescence with a showy involucre of pink to red sterile bracts; corolla pink to red, sometimes white; labellum deep crimson with white or yellow margin ..... 2. *Etlingera*
      3. Inflorescence without a showy involucre of sterile bracts; corolla and labellum pale yellow to white ..... 5. *Zingiber*

1. Inflorescence an elongated thyrse or raceme, the bracts not closely imbricate. 4
   4. Ligule tongue-like, 5-12 mm long; labellum (lip) sessile or short-clawed ..... 1. *Alpinia*
   4. Ligule a narrow band of tissue, 1-2 mm long; labellum (lip) long-clawed ..... 4. *Renealmia*

1. ALPINIA

Alpinia Roxb., Asiat. Res. 11: 350. 1810, *nom. conserv.*

Coarse aromatic herbs,1-3 m tall, with stout creeping rhizome. Pseudostems well-developed, many. leafy. Leaves numerous; blades oblong or lanceolate; ligule generally elongated and tongue-like. Inflorescence a terminal panicle, thyrse, or raceme, dense or open, the flowers often disposed in cincinni; bracts of main axis remote, minute and scale-like, ovate to lance-oblong or lanceolate; bracteoles tubular or open to base, rarely hooded, large or small, sometimes absent; cincinni stalked, 1- to 3-flowered. Flowers showy; calyx tubular to turbinate, shallowly 3-lobed, sometimes split on one side; corolla tube cylindric, about as long as the calyx, the lobes oblanceolate to elliptical, the central lobe +/- hooded; anther with or without a filament, the apex often lacking a terminal appendage; lateral staminodes very small or absent, subulate or tooth-like, or sometimes connate with base of lip; lip ovate, tubular-incurved, variously lobed or entire; ovary 3-locular with axile placentation, the ovules few to many in each cell; stigma subglobose or sometimes clavate. Fruit a subglobose, many-seeded capsule, dry or sometimes fleshy, indehiscent or irregularly dehiscent, often red; seeds numerous, globose or angled, with a fleshy or spongy aril. Approximately 230 species native to tropical and subtropical Asia, Australia, and the Pacific region, introduced in North America, Mexico, West Indies, Central America, and South America. In Puerto Rico and the Virgin Islands, only *A. zerumbet* is known to spread outside cultivation.

TYPE: *Alpinia galanga* (L.) Willd. (≡ *Maranta galanga* L.), *typ. conserv.*

1. Alpinia zerumbet (Pers.) B. L. Burtt & R. M. Sm., Notes Roy. Bot. Gard. Edinburgh 31: 204. 1972; *Costus zerumbet* Pers., Syn. Pl. 1: 3. 1805, nom. nov. for *Zerumbet speciosum* J. C. Wendl. in Schrad., Sert. Hannov. 4: 3, t 19. 1798; *Languas speciosa* (J.C. Wendl.) Small, Fl. s.e. U.S., ed. 2. 307, 1375. 1913; *Alpinia speciosa* (J.C. Wendl.) K. Schum. in K. Schum. & Hollrung, Fl. Kais. Wilh. Land 29. 1889, non D. Dietr., 1839. Type: China. "In Caldario adferuari debet" *J.C. Wendland s.n.* (holotype: GOET).

Fig. 64. A

Robust herb. Pseudostems 2-3 m tall. Ligule tongue-like, coriaceous, 5-10 mm long, obtuse, pubescent abaxially; petioles 1-1.5 cm long; blades oblong to oblong-lanceolate, 30-70 × 5-14 cm, glabrous, margins brownish strigose, often densely so distally, cuneate at base, acuminate or sub-abruptly narrowed at apex to a spirally-twisted, caudate tip. Inflorescence a raceme-like panicle, drooping, 10-30 × 7-12 cm (in flower); rachis purple-red, velvety; panicle branches short and stout, often densely pubescent, bearing 1- to 2 (-3)-flowers; bracteoles elliptic, 1.8-3.5 cm long, enveloping the buds, glabrous, white with a pink apex, deciduous. Flower pedicels 1-2 cm long; calyx subcampanulate, toothed at apex, 1.8-2.5 cm long, white; corolla tube shorter than calyx, the lobes oblong, 2.5-3 cm long, milky white tipped with pink, the central lobe larger than lateral ones; lateral staminodes subulate, ca. 2 mm long; labellum (lip) ovate or broadly ovate-spatulate, 3.5-6 cm long, the margins crisped and incurved, yellow with purple-red stripes; stamen 2.5-3 cm long; ovary hirsute, golden yellow. Capsule subglobose, ca. 2 cm in diam., ribbed, vermillion; seeds angled.

General distribution: Native of Asia, cultivated for ornament in the tropics and subtropics worldwide.

Distribution in Puerto Rico and the Virgin Islands: Moist roadsides and river banks. Commonly planted for ornament and persisting in some areas. Recorded from Arecibo, Bayamón, Caguas, Canóvanas, Cayey, Mayagüez, and Naguabo; St. Thomas.

Common names: Puerto Rico: *Boca de dragón, Pimienta Angola.*

Selected specimens examined: PUERTO RICO:

Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10854* (US). Bayamón: *Sintenis 1295* (US). Caguas: Las Cruces de Caguas, *Goll 444* (US). Canóvanas: Caribbean National Forest, La Condesa Section, *Axelrod & Schulz 5619* (US). Cayey: S of Cayey, *Liogier et al. 28483* (UPR). St. Thomas: *Eggers s.n.* (US).

Cultivated Species

Alpinia purpurata (Vieill.) K. Schum. (syn: *Guillainia purpurata* Vieill.) (Fig. 64. B), a native of Polynesia, is grown as an ornamental in Puerto Rico and throughout the tropics. *Alpinia sanderae* Sander, a native of New Guinea, was cited by Martorell et al. (1981) as cultivated in Puerto Rico.

2. ETLINGERA

Etlingera Giseke, Prael. Ord. Nat. ad 202, 209. 1792.

Robust, erect herbs; rhizomes creeping, nodose, branched, aromatic. Pseudostems (shoots) well-developed, leafy, terete. Leaves short-petiolate, lanceolate, large; ligule well-developed. Inflorescence a ovoid or subglobose head, or spike, with flowers arranged in 3 or 4 concentric circles on a flat receptacle, surrounded at base by numerous, imbricate, often conspicuous, sterile involucral bracts; peduncles arising laterally from rhizomes near bases of pseudostems, growing well above ground and elongate or subterranean and short; fertile bracts subtending a single bracteole and flower; bracteoles long-tubular, 2- to 3-toothed, persistent; calyx tubular, membranous, unilaterally split, the apex 3-toothed; corolla tube equaling or longer than the calyx, 3-lobed at apex, much shorter than the tube. Lateral staminodes absent or represented as rudimentary often hairy teeth or bumps. Labellum tongue-shaped, more or less 3-lobed, adnate at base to filament and forming a distinct tube, the central lobe with entire or 2-lobed apex, the lateral lobes basally folded over stamen; stamen shorter than the labellum, the free part of filament very short and rather broad, the anthers bent forward, truncate and emarginate at apex, connective appendage absent; style slender, the stigma broad with a dorsal callus; ovary 3-locular, the ovules numerous in each locule. Capsule indehiscent, fleshy, obovoid or subglobose, subterete or angular, smooth, longitudinally ridged or with obtuse warts in rows. Approximately 70 species distributed in tropical or subtropical regions of China, India, Indonesia, Malesia, Philippines, Thailand and northern Australia.

TYPE: *E. littoralis* (J. König) Raeusch. (≡ *Amomum littorale* J. König).

Reference: Burtt, B. L. & R. M. Smith. 1986. *Etlingera*: the inclusive name for *Achasma, Geanthus* and *Nicolaia* (Zingiberaceae). Notes Roy. Bot. Gard. Edinburgh 43: 235-241.

1. Etlingera elatior (Jack) R. M. Sm., Notes Roy. Bot. Gard. Edinburgh. 43: 244. 1986; *Alpinia elatior* Jack, Malayan Misc. 2 (7): 2. 1822; *Nicolaia elatior* (Jack) Horan., Prodr. Monogr. Scitam. 32. 1862. Type: Sumatra. *Jack s.n.* (presumably lost).

Coarse herb often growing in large colonies. Pseudostems (shoots) 3-6 m tall. Leaves numerous; ligule to 1.5 cm long, shortly 2-lobed, glabrous; petiole 1.5-4 cm long; leaf blades lanceolate, 38-85 × 8-18 cm, glabrous. Inflorescence a terminal, ovoid head of spirally imbricated flowers, surrounded at base by showy involucral bracts; peduncle 60-150 × 0.8-1.5 cm, clothed with green, glabrous sheaths; involucral bracts 3-6 × 2-3 cm, spreading, the upper obtuse to emarginate, the lower abruptly narrowed to a caudate tip, crimson-pink, glabrous; floral bracts similar to involucral bracts but pinkish, smaller; bracteoles tubular, ca. 2 cm long, unilaterally split; calyx 3-4 cm long, unilaterally split, the apex 3-toothed; corolla pink to red, sometimes white; labellum deep crimson with white or yellow margin; filament short, flat, whitish pubescent; anther red, longer than filament. Fruiting head greenish or reddish, globose, 2-2.5 cm in diam., short-pubescent; seeds many, black.

General distribution: Native of Indonesia, Malesia, and southern Thailand; widely cultivated as an ornamental or for food and often becoming naturalized in tropical and subtropical regions worldwide.

Distribution in Puerto Rico and the Virgin Islands: Naturalized populations of this species occur in the Luquillo Mountains; common in one

area along a roadside (Acevedo-Rdgz., pers. comm., 2005).

Common names: Puerto Rico: *Antorcha, Torch Ginger.*

3. HEDYCHIUM

Hedychium J. König in Retzius, Observ. Bot. 3: 73. 1783.

Epiphytic or terrestrial, aromatic herbs with tuberous rhizomes. Pseudostems erect, leafy. Leaf blades typically oblong or lanceolate; sheaths open; ligule large, membranous. Inflorescence a terminal, spicate thyrse, densely-flowered; bracts densely imbricate, 1- to several-flowered; bracteoles tubular. Flowers showy; calyx tubular, often split on one side, the apex truncate or shortly 3-lobed; corolla with a long and slender tube, the lobes linear, shorter than the tube, reflexed at anthesis; labellum large, suborbicular, deeply 2-lobed or cleft at apex, with a long or sometimes short claw; lateral staminodes 2, petaloid, larger than the corolla lobes; stamen usually with an elongate filament, the anther dorsifixed, divaricate at base, unappendaged at apex; ovary 3-locular with axile placentation. Fruit a globose, 3-valved, loculicidal capsule; seeds numerous; aril lacerate, red.

TYPE: *H. coronarium* J. König

1. Hedychium coronarium J. König in Retzius, Observ. Bot. 3: 73. 1783. Type: Asia. *J. G. König s.n.* (holotype: probably at BM; isotype: C).

Fig. 64. D

Herb, the pseudostems 1-3 m tall. Leaves sessile; sheaths whitish or tawny floccose distally; ligule 2-3 cm long, bi-lobed at apex, membranous, glabrous or with appressed-pubescence; blades oblong-lanceolate or lanceolate, 20-40 × 4.5-8 cm, long-acuminate to apex, acute at base, adaxially glabrous to sparsely puberulous, abaxially sparsely to densely whitish floccose. Inflorescence 10-20 × 4-8 cm, ellipsoid; bracts imbricate, 2- to 3-flowered, ovate, 4.5-5 × 2.5-4 cm, chartaceous with membranous margins, green; bracteoles 30-35 mm long. Flowers white, fragrant; calyx split on one side, 3-4.5 cm long; corolla tube 7-8 cm long, 3 mm in diam., lobes reflexed, the central lobe spatulate, the lateral ones linear-lanceolate, 3-5 cm × 3 mm; lateral staminodes oblong-lanceolate or elliptic, 3.5-5.5 × 1.5-3 cm, white with yellow at base; labellum obcordate, 2-lobed, short-clawed at base, 4-6 cm long, 5-6 cm wide when spread out, white, pale yellow at base; filament 2.5-3.5 cm long, white, the anther 12-15 mm long; ovary sericeous. Capsule oblong, glabrous, the valves orange-yellow within; seeds with a crimson aril.

General distribution: Native to the Himalayan region; cultivated in tropical regions worldwide.

Distribution in Puerto Rico and the Virgin Islands: Moist roadsides, ditches, and river banks. Commonly planted for ornament, naturalized and spreading. Recorded from Adjuntas, Bayamón, Cayey, Ciales, Maricao, Mayagüez, Naguabo, Ponce, Río Grande, and Toa Alta. Not collected in the Virgin Islands but very likely cultivated there.

Common names: Puerto Rico: *Jazmín cimarrón, Jazmín del río, Mariposa blanca, Narciso, Nardo, Dulce nieve.*

Selected specimens examined: PUERTO RICO: Bayamón: *Heller & Heller 419* (US). Cayey: *Sintenis 1881* (US). Ciales: Bo. Fronton, *Otero 354* (UPR). Maricao: *Sintenis 494* (US). Mayagüez: *Sargent 437* (US). Naguabo: Sierra de Naguabo, *Shafer 3417* (US). Ponce: 20 mi. N of Ponce, along Hwy 139, *Hansen et al. 9209* (UPR). Río Grande: El Yunque, Luquillo Mts., *Liogier et al. 29299, 29474, 3322* (UPR). Toa Alta: *Stevenson 3047* (US).

Excluded Species

Hedychium flavum Roxb., Fl. Ind. 1: 81. 1820. Several specimens of a *Hedychium* collected in the Luquillo Mountains of Puerto Rico and recorded as having yellow or green flowers were reported by Liogier & Martorell (2000) as *H. flavum* Roxb. However, the whitish floccose to sparsely whitish floccose abaxial leaf surface and ellipsoid inflorescence spike are characteristic of *H. coronarium* while *H. flavum* Roxb. has a glabrous

abaxial leaf surface and an oblong inflorescence spike. The specimens in question also have the bilobed ligule characteristic of *H. coronarium*, wich separates them from the closely related yellow-flowered *H. flavescens* Carey ex Roscoe. Heavy insect damage of the flowering material of the specimens precluded comparison of any further diagnostic characteristics between the yellow-flowered species and *H. coronarium*. The specimens probably represent only a color variation of *H. coronarium*.

4. RENEALMIA

Renealmia L. f., Suppl. 7, 79. 1782, *nom. conserv.*

Aromatic rhizomatous herbs; rhizomes sympodial, subterranean. Pseudostems well-developed or short. Leaves cauline, the lowermost reduced to sheaths; sheaths open, reticulate, striate, or sometimes smooth, often with short prickle-like hairs; petioles well-developed or wanting; ligule a narrow band of tissue 1-2 mm long; blades narrowly elliptic to narrowly oblong-elliptic or elliptic-oblanceolate, cuneate at base, acute to acuminate at apex, essentially glabrous. Inflorescence a terminal thyrse or raceme, rarely a spike, borne on a separate shoot, the leaves of which are reduced to bladeless sheaths (cataphylls) or sometimes they are blade-bearing; axis and branches of inflorescence often pubescent; bracts herbaceous to membranous, deciduous, subtending single flowers or cincinni of 2-13 (-17) flowers; bracteoles herbaceous, often tubular and enveloping flowers at anthesis or sometimes open and cup-shaped before anthesis; calyx coriaceous, tubular, turbinate, or less often urceolate, 3-lobed, the lobes deltate to triangular; corolla tubular proximally, the tube slightly longer than the calyx, 3-lobed, the lobes narrowly elliptic, the 2 lateral lobes often smaller than the dorsal one; labellum (lip) clawed at base, often with 2 lateral, small, tooth-like staminodes. Stamen filament short, ca. 1 mm long or wanting; stigma cup-shaped. Capsule 3-locular, globose to ellipsoid, rather fleshy, loculicidally dehiscent, often black or red; seeds irregularly ellipsoid, glossy, brown, with a large, yellow, orange, or white aril.

TYPE: *Renealmia exaltata* L. f.

Reference: Maas, P. J. M. 1977. *Renealmia* (Zingiberaceae-Zingiberoideae), Costoideae (Zingiberaceae) Additions. Fl. Neotrop. Monogr. 18: 1-161.

Key to the species of *Renealmia*

1. Leaves of inflorescence shoots blade-bearing; corolla white or light pink; labellum burgundy with white center ..... 3. *R. jamaicensis* var. *puberula*
1. Leaves of inflorescence shoots with sheaths only (blades wanting); corolla and labellum yellow, orange, or red 2
    2. Inflorescence a raceme, rarely a thyrse, the cincinni 2- to 6-flowered; calyx (12-) 15-20 (-25) mm long; corolla 18-32 mm long; capsule (10-) 15-35 (-40) × (6-) 8-20 (-25) mm; seeds more than 25 ..... 1. *R. alpinia*
    2. Inflorescence a thyrse, the cincinni 2- to 17-flowered; calyx 3-10 mm long; corolla 13-16 mm long; capsule 4-12 (-14) × 4-9 mm; seeds 10-25..... *2 R. aromatica*

1. Renealmia alpinia (Rottb.) Maas, Acta Bot. Néerl. 24: 474. 1976; *Amomum alpinia* Rottb., Soc. Med. Havn. Collect. 2: 245, 248, t. 1. 1775. Type: Surinam. *Rolander s.n.* (holotype: probably at C).

Renealmia exaltata L. f., Suppl. Pl. 79. 1782 ["1781"]; *Alpinia exaltata* (L. f.) Roem. & Schult., Syst. Veg. 1: 21. 563. 1817. Holotype: Surinam. *Dahlberg 64* (LINN).

Renealmia bracteosa Griseb., Fl. Brit. W. I. 601. 1864. Type: Dominica. *Imray s.n.*, 1859 (holotype: GOET; isotype: K).

Renealmia exaltata var. [β] *gracilis* K. Schum. in Urban, Symb. Antill. 4: 158. 1903. Syntypes:

Puerto Rico; Luquillo Mountains. *Eggers 888* (BR, GH, L, M, P, PR, W) and *Eggers 1161* (C in part, US!).

Robust herb, 1-6 m tall; rhizomes 1-3 cm thick. Leaves sessile or short-petioled, the petioles often pubescent; sheaths smooth and glabrous or sparsely setose hairs; ligule short, 1-2 mm long; blades narrowly elliptic, 30-110 (-150) × 5-20 cm, acuminate at apex, cuneate at base, glabrous or sometimes sparsely pubescent abaxially; scape of inflorescence erect, 15-50 (-70) × 0.3-1 cm, reddish, clothed with sheaths 6-21 × 1-2.5 (-3.5) cm. Inflorescence a basal raceme or sometimes thyrse, 12-55 × 4-8 cm, with 2- to 6-flowered cincinni, more or less hirsute, the rachis, bracts, bracteoles, peduncles, and calyx pink to red; bracts ovate to narrowly ovate, 1.5-10 (-17) × 0.3-1 (-2) cm, membranous; peduncles 5-25 (-35) mm long; pedicels 2-15 (-20) mm long; bracteoles 15-30 (-35) mm long; calyx tubular, (12-) 15-20 (-25) × 4-8 (-10) mm, membranous, appressed-pubescent, pink to red; corolla glabrous,18-32 mm long, yellow, orange, or red, the tube 12-17 mm long, the lobes oblong, 13-15 mm long; labellum 10-12 × 6-10 mm when spread out, yellow, limb erect, 5-6 × 6-10 mm, more or less lobed, the middle lobe entire and rounded, lateral lobes involute, rounded, 3-5 × 2-3 mm; lateral staminodes ca. 2 mm long. Anther 8-12 mm long, dark yellow; style 18-30 mm long; nectarial glands surrounding the style base, multilobular; ovary ellipsoid, red. Capsule ellipsoid, crowned by the circumcissile calyx, (10-) 15-35 (-40) × (6-) 8-20 (-25) mm, red, maturing black-purple; seeds numerous, angled, 2-4 mm in diam.; aril orange.

General distribution: Mexico, Central America, Puerto Rico, the Lesser Antilles, and tropical South America.

Distribution in Puerto Rico: In wet forests and river banks. Recorded from Bayamón, Juncos, Manatí, Naguabo, and Río Grande.

Common names: Puerto Rico: *Bihao, Bijao, Jengibre de jardín.*

Selected specimens examined: PUERTO RICO: Bayamón: *Stahl 685* (US). Fajardo: Río Arriba, *N.L. Britton & Shafer 1682* (US). Juncos: *Sintenis 2551b* (US). Manatí: near Manatí, *Sintenis 6626* (US). Naguabo: Vicinity of La Florida, *Shafer 3132* (UPR, US). Río Grande: El Verde, Luquillo Mts., *Liogier et al. 28619* (UPR); Sierra de Luquillo, *Sintenis 1591* (US).

2. Renealmia aromatica (Aubl.) Griseb., Abh. Königl. Ges. Wiss. Göttingen 7: 275. 1857; *Alpinia aromatica* Aubl., Hist. Pl. Guiane 3. 1775. Lectotype: Plumier, *manuscript no. 5, t. 27 & 28* (P), designated by P. Maas & H. Maas, Moscosoa 6: 149. 1990.

Renealmia occidentalis (Sw.) Sweet, Hort. Brit. ed. 2. 493. 1830; *Alpinia occidentalis* Sw., Prodr. 11. 1788. Lectotype: Jamaica. *Swartz s.n.* (M), designated by Maas, Fl. Neotrop. Monogr. 18: 105. 1977.

Robust herb, (0.8-) 1-3 (-4) m tall; rhizomes 1-1.5 cm thick. Leaves sessile or sometimes short-petioled, the petioles glabrous; sheaths finely veined, glabrous; ligule short, 1-2 mm long, glabrous; blades narrowly elliptic, 13-55 × (2-) 4-12 cm, acute or acuminate at apex, cuneate at base, glabrous; scape of inflorescence erect, (15-) 40-65 (-100) cm long, up to 5 mm thick, reddish, clothed with sheaths 4-15 × 0.5-1.5 cm. Inflorescence a basal, rarely a terminal, thyrse, 10-35 × 2-7 cm, with 2- to 17-flowered cincinni, more or less hirsute, the rachis, bracteoles, peduncles, and calyx red; bracts narrowly triangular-ovate to triangular-ovate, acute or obtuse, 0.6-7.5 × 0.3-1 cm, membranous, pale green; peduncles 4-10 (-12) mm long; pedicels 3-10 (-17) mm long, bracteoles 7-17 mm long; calyx turbinate, 3-10 × 4-7 mm, membranous, appressed-pubescent proximally, pink to red, the lobes depressed-ovate, obtuse, 1-3 × 3-5 mm; corolla glabrous,13-16 mm long, yellow, the tube 12-17 mm long, the lobes oblong, 13-15 mm long; labellum 7-9 × 5-9 mm when spread out, yellow, limb erect, 4-7 × 5-9 mm, more or less lobed, the middle lobe reflexed, rounded and entire, lateral lobes rounded, 3-5 × 1-2 mm; lateral staminodes ca. 1-1.5 mm long. Anther 5-7 mm long, dark yellow; style 14-17 mm long; nectarial glands partly surrounding the excentric style base; ovary ellipsoid, red. Capsule globose to ellipsoid, 4-12 (-14) × 4-9 mm, red, rarely purple-black; seeds 10-25, obtusely angled, 2-3 × 2-4 mm; aril orange.

General distribution: Mexico, Central America, West Indies, and northwestern South America.

Distribution in Puerto Rico: In forested areas. Recorded from Arecibo, Cayey, and Río Grande.

Common names: Puerto Rico: *Bihao, Bijao, Narciso.*

Selected specimens examined: PUERTO RICO: Arecibo: Bosque de Río Abajo, Camp Radley, *Acevedo-Rdgz. 536* (SJ). Cayey: Guavate, *Liogier et al. 29833* (UPR). Río Grande: Coco Beach, *Liogier et al.29264* (UPR).

3. Renealmia jamaicensis var. **puberula** (Gagnep.) Maas, Acta Bot. Néerl. 24: 477. 1976; *Renealmia antillarum* var. *puberula* Gagnep., Bull. Soc. Bot. France 50: 203. 1903; *Alpinia antillarum* var. *puberula* (Gagnep.) Moscoso, Cat. Fl. Doming. 88. 1943. Lectotype: Dominican Republic. *Richard s.n.* (P), designated by Maas, Fl. Neotrop. Monogr. 18: 88. 1977.

Alpinia antillarum sensu Urban., 1920 and Britton & P. Wilson, 1924, non Roem. & Schult., 1817.

Fig. 64. E

Robust herb, 1-3 m tall; rhizomes ca. 1 cm thick. Leaves sessile or sometimes short-petioled; sheaths finely veined, glabrous or sometimes with furcate or stellate prickles near margins and ligule; ligule short, 0.5-1 mm long, essentially; blades narrowly elliptic, 10-31 (-40) × 2.7-8 cm, the uppermost leaves often strongly reduced, acute or shortly acuminate at apex, cuneate at base, glabrous. Inflorescence a dense, thyrse, 6-17 × (1.5-) 3-8 cm, with 2- to 5-flowered cincinni, the peduncles and pedicels densely to sparsely covered with sessile or short-stalked furcate to plurifurcate hairs, often mixed with simple hairs; rachis pink to red, pubescent or sometimes glabrous; bracts ovate to triangular, acute or obtuse, 0.8-3 (-4) × 0.3-1 (-1.5) cm, membranous, red, pinkish red, or scarlet; peduncles 2-10 (-12) mm long; pedicels 2-15 (-20) mm long; bracteoles (7-) 8-11 (-13) mm long, red; calyx tubular to slightly turbinate, 5-11 (-13) × 3-6 mm, membranous, essentially glabrous, dark pink to magneta, the lobes obtuse, 1-2 × 2-4 mm; corolla glabrous, (15-) 20-25 mm long, white or light pink, the tube 6-12 mm long, the lobes oblong, 6-13 × 3-5 mm; labellum 5-8 × 5-8 mm when spread out, burgundy with white center, limb erect, 3.5-6 × 5-8 mm, more or less lobed, the middle lobe obscurely divided into two broadly ovate-deltate to ovate-triangular lobules, 0.5-1 × 1.5-4 mm; lateral staminodes 0.8-1.3 × 0.30-0.5 mm. Anther 6 mm long, red; style 20-23 mm long; nectarial glands multilobulatė, completely surrounding the style base; ovary ellipsoid, sparsely pubescent, red. Capsule globose to ellipsoid, 5-10 × 5-8 (-10) mm, red, maturing black or puple; seeds 5-25, obtusely angled, 1.5-3 × 2-3.5 mm; aril orange.

General distribution: Hispaniola and Puerto Rico.

Distribution in Puerto Rico: Wet or damp montane forest and shaded places. Recorded from: Adjuntas, Barranquitas, Cayey, Ciales, Guayama. Humacao, Luquillo, Maricao, Naguabo, Ponce, Río Grande, and Utuado.

Common name: Puerto Rico: *Narciso colorado.*

Selected specimens examined: PUERTO RICO: Adjuntas: Alto de la Bandera, *E.G. Britton & Marble 2034* (US). Barranquitas: Monte Torrecilla, *N.L. Britton et al. 5606* (US). Guayama: Mountain between Guayama & Cayey, *N.L. Britton et al. 6572* (US). Humacao: Mt. Britton, Luquillo National Park, *Jones 11023* (US). Maricao: *Sintenis 216* (US). Naguabo: Sierra de Naguabo, *Shafer 3225* (US). Ponce: Toro Negro Forest Reserve, *Acevedo-Rdgz. & Breckon 7832* (US). Río Grande: Sierra de Luquillo, *Sintenis 1578* (US); Luquillo Mountains, Caribbean National Forest, El Yunque area, *Acevedo-Rdgz. 6224* (NY, US). Utuado: Bo. Gaonico, *Proctor et al. 47107* (US).

5. ZINGIBER

Zingiber Mill., Gard. Dict. Abr. ed. 4. [as "*Zinziber*"], *nom. et orth. conserv.*

Rhizomatous aromatic herbs; rhizomes tuberous, branched. Pseudostems erect, elongate, leafy. Leaves distichous, with short petioles or sessile; petioles swollen, cushion-like; ligule small, deeply 2-lobed or entire; blades oblong, lanceolate, or linear. Inflorescence spicate, conical, borne on a separate

shoot from the rhizome, the leaves of which are reduced to bladeless sheaths (cataphylls); bracts closely imbricate, 1-flowered, persistent; bracteoles split to the base, not tubular. Flowers solitary in the axils of the bracts; calyx tubular, split on one side, 3-toothed at apex; corolla slender, 3-lobed, the central lobe often wider than the lateral ones, white or cream; lateral staminodes adnate to the labellum forming a 3-lobed organ, the central lobe retuse or cleft at apex; stamen with a short filament, the connective elongating and enfolding the style; style slender, the stigma not expanded. Capsule loculicidally or irregularly dehiscent; seeds black, shiny, covered by an aril; aril white, the margin irregularly lacerate.

TYPE: *Zingiber officinale* Roscoe (≡ *Amomum zingiber* L.).

Reference: Theilade, I. 1996. Revision of the genus *Zingiber* in Peninsular Malaysia. Gard. Bull. Singapore 48: 207-236. Theilade, I. 1999. A synopsis of the genus *Zingiber* (Zingiberaceae) in Thailand. Nord. J. Bot. 19: 389-410.

Key to the species of *Zingiber*

1. Leaf blades linear to linear-lanceolate or broadly lanceolate, 2-4 (-5) cm wide; ligule ca. 2-10 mm long, sparsely pubescent, bi-lobed; bracts red or purplish brown ..... 1. *Zingiber montanum*
2. Leaf blades broadly lanceolate or oblong-lanceolate, 3-8.5 cm wide; ligule 15-35 mm long, scarious, entire; bracts initially green, maturing red..... 2. *Zingiber zerumbet*

1. Zingiber montanum (J. König) Link ex Dietr., Sp. Pl. 1. 52. 1831; *Amomum montanum* J. König in Retz., Observ. 3: 51. 1783. Type: Thailand; Phuket. *Koenig s.n.* (holotype: C).

Zingiber purpurem Roscoe, Trans. Linn. Soc. 8: 348. 1807. Type: Cultivated in the Liverpool Botanic Garden, no specimen known.

Zingiber cassumunar Roxb., Asiat. Res. 347, t. 5. 1810. Type: Burtt and Smith in Dassanayake (Flora of Ceylon 4: 494), indicate the lectotype is probably Roxburgh's drawing 501 which is at K.

Rhizomes internally pale carrot color. Pseudostems 1.2-1.8 m tall. Leaves sessile or short-petiolate; sheaths glabrous or pubescent along edges, green; ligule 2-10 mm long, sparsely pubescent, bi-lobed; blades linear to linear-lanceolate or broadly lanceolate, 13-35 (-60) × 2-4 (-8) cm, hirsute adaxially, acuminate at apex, narrowly cuneate at base. Inflorescence fusiform or cylindric-ovate, 8-15 × 3-4 cm, acute at apex, the shoot (scape) erect, 8-60 cm tall with 5-7 cataphylls; mature bracts ovate, obtuse to broadly so at apex, 3-3.5 × 1-1.7 cm, pubescent, with a subscarious, greenish, black-lineolate margin, red or purplish brown; bracteoles ovate, 1-1.5 cm long, 3-dentate. Calyx 1.2-1.5 cm long, membranous, truncate, unilaterally split, white, glabrous; corolla 4-6 cm long, the lobes linear-lanceolate, pale yellow to white, reddish lineolate on margins; labellum 6 cm long and 2.5 cm wide, white or pale yellow, the central lobe broadly rounded, the lateral lobes oblong, free nearly to base. Stamen ca. 1 cm long; ovary 3-4 mm long, pubescent. Capsule ovoid, ca. 1.5 cm diam.

General distribution: Probably native to India; widely cultivated in southeast Asia for medicinal uses. Often escaping cultivation in the Greater Antilles.

Distribution in Puerto Rico: Naturalized in moist second-growth forest in limestone hills, 200-250 m; Isabela.

Common name: Puerto Rico: *Jengibre colorado.*

Selected specimens examined: PUERTO RICO: Isabela: Bo. Arenales, trail on W side of Rt. 112, *Axelrod & Thomas 11949* (UPRRP).

2. Zingiber zerumbet (L.) Roscoe ex Sm., Exot. Bot. 2: 105. 1805; *Amomum zerumbet* L., Sp. Pl. 1. 1753. Type: To be sought among several syntypes.*

Costus glabratus sensu Bello, 1883, non Swartz, 1788.

Fig. 64. C

Rhizomes internally light yellow to yellow. Pseudostems 0.6-2 m tall. Leaves sessile or short-petiolate; sheaths glabrescent, green; ligule 1.5-3.5 cm long, scarious, entire; blades broadly lanceolate or oblong-lanceolate, 15-40 × 3-8.5 cm, glabrescent, acuminate at apex, cuneate at base. Inflorescence ovoid to ovoid-oblong or ellipsoid,

6-15 × 2.5-5 cm, obtuse at apex, the shoot (scape) erect, 10-45 cm tall with 6-8 cataphylls; mature bracts broadly obovate or spatulate, broadest above middle, broadly rounded or obtuse at apex, 3-3.5 × 2-3 cm, appressed-pubescent proximally, with a subscarious, red-lineolate margin, initially green, maturing red; bracteoles linear to lanceolate, 1.5-3.5 cm long. Calyx 1.2-2.5 cm long, membranous, white; corolla 3.5-5.5 cm long, the lobes lanceolate, pale yellow to white; labellum 1.5-2.5 cm long, pale yellow to white, the central lobe emarginate, the lateral lobes free nearly to base. Stamen ca. 1 cm long, the connective ca. 8 mm long; ovary ca. 4 mm long, glabrous. Capsule ellipsoid or obovoid, 0.8-1.5 cm long, red.

General distribution: Native of southeast Asia. Cultivated in tropical regions worldwide for culinary or medicinal uses.

Distribution in Puerto Rico: Wet roadsides, stream and river banks, and shaded forested areas. Recorded from: Arecibo, Bayamón, Cataño, Cidra, Fajardo, Maricao, Mayagüez, Naguabo, Utuado, Vega Alta, Vega Baja, and Yabucoa.

*Note.** A lectotypification made by Theilade (Gard. Bull. Singapore 48: 228. 1996) is erroneous because the proposed lectotype is not part of the original material.

Common name: Puerto Rico: *Jengibre amargo.*

Selected specimens examined: Puerto Rico: Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 11382* (US). Bayamón: *Hioram 326* (US). Cataño: *Goll 1058* (US). Cidra: Pueblo Viejo, *Stevenson 6620* (US). Fajardo: Río Arriba, *Liogier et al. 34479* (UPR). Maricao: Maricao State Forest, Liogier 35674 (UPR). Mayagüez: *Sintenis 124* (US). Naguabo: Sierra de Naguabo, *Shafer 3143* (US). Utuado: Bo. Don Alonso, *Acevedo-Rdgz. 13419* (FTG, MAPR, NY US). Vega Alta: Between Vega Alta & Corozal, *Liogier & Liogier 37356* (UPR). Vega Baja: Rd. 155, km 5, *Woodbury s.n.* (UPR). Yabucoa: vic. Sta. Helena, *Sintenis 5117* (US).

Cultivated Species

Zingiber officinale Roscoe, native to Asia, was cited by Martorell et al. (1981) as cultivated in Puerto Rico.

CULTIVATED GENERA

Species from several genera of Zingiberaceae are cultivated in Puerto Rico and are sometimes persistent after cultivation but have not become naturalized. *Curcuma longa* L., native to Asia, is recorded by specimen records from Aguada (*Sargent 585*, US), Maricao (Near Rosario, *Liogier et al. 30943*, UPR), Mayagüez (*Sintenis 491*, US), and Moca. *Kaempferia rotunda* L., native to the East Indies, was cited by Liogier & Martorell (1982, 2000) and is based on a specimen record from the Río Abajo Forest Reserve (Arecibo: Río Abajo, *Liogier et al. 30879*, UPR). However, the identity of the specimen is uncertain because it is sterile and has uncharacteristic leaves for that species.

Family 26. **COSTACEAE** *Costus Family*

Costaceae Nakai, J. Jap. Bot. 17: 203. 1941.

by G. R. Proctor

Mostly tall, non-aromatic, perennial, glabrous or pubescent herbs with creeping tuberous rhizomes; aerial stems unbranched (except occasionally leafy branch shoots arising from the base of an old inflorescence or from leaf-axils), terete, straight or spirally contorted, with closed leaf sheaths and a truncate or 2-lobed ligule. Leaves short-petioled, spirally attached to the stem, mostly elliptic (rarely lanceolate or obovate), glabrous or variously pubescent. Inflorescence a terminal strobiloid or capitate spike, or else flowers solitary in leaf-axils, or rarely terminating a short leafless stem unlike the taller sterile leafy ones. Bracts closely imbricate, each bract subtending one flower (or 2 flowers in some African species), and each with a linear nectarial callus just below the apex. Bracteole folded or tubular. Calyx

tubular, shortly 3-lobed, the lobes subequal. Corolla tubular at base, the tube equaling the calyx; outer portion 3-lobed, the lobes narrowly elliptic, the dorsal one larger than the two lateral ones. Labellum equaling or much exceeding the corolla, oblong-obovate to broadly obovate when spread out, often more or less 3-lobed, the middle lobe small, the lateral lobes small to very large, their margins crisped, fimbriate, or entire. The single stamen petaloid, the anther usually attached at the middle. Style filiform; stigma bilamellate, provided with a 2-lobed dorsal appendage, or else cup-shaped and without an appendage. Two nectar glands present toward apex of the ovary. Ovary 3-locular or 2-locular; ovules numerous. Fruit a 3- or 2-locular capsule crowned by the persistent calyx, longitudinally dehiscent, or indehiscent and rupturing irregularly when ripe. Seeds angular-ovoid to four-sided prismatic, arillate, glossy black or brown; endosperm copious. A pantropical family of 4 genera and ca. 100 species, most of them in the genus *Costus*. Only *Costus* occurs in Puerto Rico.

TYPE: *Costus* L.

Reference: P. J. M. Maas. 1972. Costoideae (Zingiberaceae). Fl. Neotrop. Monogr. 8: 1-140.

1. COSTUS

Costus L., Sp. Pl. 2. 1753.

Characters chiefly as given for the family. Large, tall, low, or acaulescent herbs, with flowers in strobilaceous spikes and ovary 3-locular.

TYPE: *Costus arabicus* L.

Key to the species of *Costus*

1. All bracts provided with foliaceous appendages ..... 1. *C. guanaiensis var. macrostrobilus*
1. Bracts without appendages (or appendages only on lowest bracts). 2
   2. Bracts sharp-pointed (pungent) at the apex, red; underside of leaves densely sericeous; calyx 22-25 mm long. ..... 4. *C. speciosus*
   2. Bracts never pungent; calyx 3-16 mm long. 3
      3. Plants less than l m tall; ligule hardly 1 mm long; leaves broadly obovate or elliptic, marked with faint bands of light and dark green, densely villous on upper side, glaucous and densely puberulous beneath ..... 2. *C. malortieanus*
      3. Plants up to 2.5 m tall or more; ligule 2-15 mm long; leaves narrowly elliptic, not marked, variously pubescent but never villous on upper side. 4
         4. Exposed part of bracts orange-red; calyx 3-7 mm long ..... 3. *C. scaber*
         4. Exposed part of bracts greenish; calyx 9-16 mm long ..... 5. *C. spicatus*

1. Costus guanaiensis var. **macrostrobilus** (K. Schum.) Maas, Fl. Neotrop. Monogr. 8: 52. 1972; *Costus macrostrobilus* K. Schum. in Urban, Symb. Antill. 4: 159. 1903. Type: Puerto Rico; Sierra de Luquillo. *Eggers 1289* (lectotype: US!; isolectotype: C), designated by Maas, Fl. Neotrop. Monogr. 8: 54. 1972.

Plants stout, mostly 2-6 m tall; sheaths 10-40 mm in diam., glabrous to puberulous or villose. Ligule truncate, 5-10 (-15) mm long; petioles 5-20 mm long; leaf blades narrowly ovate to narrowly obovate, shortly acuminate at the apex, cuneate, rounded, or rarely cordate at the base, mostly 20-65 × 5-15 cm, the upper surface strigose and somewhat scabrid to the touch. Inflorescence ovoid, obtuse, 5-15 (-30) cm: long, 4-6 (-10) cm thick, terminating a leafy stem; bracts green on the exposed part, usually red on the covered part, coriaceous, broadly ovate, 2-4 (-6) cm long, 1.5-5 cm wide; appendages foliaceous, rarely absent, rigid, green, ascending or slightly reflexed, narrowly to broadly deltate, 2-4 cm long or more, 1.5-2 cm wide or more; bracteoles red, often green-tipped, 2.5-4 cm long, glabrous to densely puberulous. Calyx red, 14-18 (-22) mm long. Corolla usually white, 7-10 cm long, glabrous to puberulous, the tube ca. 2 cm long, the lobes

narrowly obovate; labellum white or yellowish white, broadly obovate when spread out, 7.5-11 × 6-7 cm, the lateral lobes usually striped with red, the middle lobe reflexed, blotched with yellow to orange in the center. Stamen narrowly elliptic, 4-6 cm long, up to 2 cm wide; anther 1-1.4 cm long. Ovary 0.5-1 cm long, densely puberulous to glabrous. Capsule 1.2-2.2 cm long, puberulous to glabrous; seeds black.

General distribution: This variety occurs in Central America, Puerto Rico, Trinidad, and northern South America (to Peru). Three other varieties exist.

Distribution in Puerto Rico: Grows in moist or wet thickets at low to upper middle elevations (90-860 m), locally frequent. Recorded from Arecibo, Ceiba, Florida, Río Grande, and Utuado.

Common name: Puerto Rico: *Caña india.*

Selected specimens examined: PUERTO RICO: Arecibo: Río Abajo State Forest, along Igartua trail, *Acevedo-Rdgz. 10597* (US). Río Grande: Sierra de Luquillo, *Sintenis 1740* (US); *Proctor 44752* (US).

2. Costus malortieanus H. Wendl., Hamburger. Garten-Blumenzeitung 19: 30. 1863. Type: Costa Rica. *Wendland s. n.* (probably at GOET).

Plants less than 1 m tall; sheaths reddish near insertion of the petiole, to 2 cm in diam., glabrous to variously hairy; ligule truncate, hardly 1 mm long; petiole to 2 mm long, densely villose; leaf blades obovate to elliptic, mostly 15-26 × 9-15 cm, blunt and very shortly apiculate at the apex, cuneate at base, the upper side lightly to densely villose, light green marked with faint darker green bands, the underside paler green or glaucous and puberulous. Inflorescence globose to short-cylindrical, 4-9 cm long, ca. 4 cm in diam.; exposed part of bracts green, the covered part reddish; bracts coriaceous, broadly ovate, obtuse, 3-4 cm long and wide, glabrous; bracteoles reddish, 1.4-2 cm long, glabrous. Calyx reddish to greenish, 5-9 mm long. Corolla yellow to cream, 5-7 cm long, glabrous, the tube 1-2 cm long, the lobes narrowly obovate; labellum yellow, broadly obovate when spread out, 4-6 cm long, 3.5-5 cm wide with slightly crenulate margins, the lateral lobes usually striped with dark red, the middle lobe reflexed with 3 spatulate lobules. Stamens white, slightly tinged with purple, narrowly elliptic, 4.2-4.5 cm long, with recurved, slightly 3-lobulate apex; anthers 6-7 mm long. Ovary 5-8 mm long, glabrous. Capsule ellipsoid, trisulcate, 12 mm long, glabrous; seeds black.

General distribution: Native to Nicaragua and Costa Rica in moist to wet lowland forests; cultivated worldwide for its attractive foliage.

Distribution in Puerto Rico: Found naturalized at one site in Río Grande.

Selected specimens examined: PUERTO RICO: Río Grande: El Verde area, disturbed secondary rain-forest, ca 240 m elevation, *Proctor 50425* (SJ).

3. Costus scaber Ruiz & Pav., Fl. Peruv. 1: 2, t. 3. 1798. Type: Peru. *Ruiz & Pavón s. n.* (BM, fragment).

Fig. 38. A-H

Slender plants up to 3 m tall; sheaths glabrous to puberulous, mostly 0.5-1.5 cm in diam.; ligules obliquely truncate, 2-12 mm long; petioles 2-10 mm long, puberulous to glabrous; leaf blades narrowly elliptic, 10-32 × 3-11 cm, acuminate at the apex, cuneate to rounded (rarely cordate) at base, the upper surface glabrous to sparsely puberulous but with the costa densely strigulose, the underside glabrous to minutely puberulous with the costa often densely sericeous. Inflorescence ovoid to narrowly cylindrical, 4-10 cm long elongating to 22 cm in fruit, 1.5-3.5 cm thick and to 4.5 cm in fruit; bracts orange-red to red, broadly ovate, 2-3.5 cm long, obtuse, coriaceous, glabrous to puberulous or rarely strigose, the margins of the covered part usually lacerating into fibers; bracteoles reddish, 0.9-1.2 cm long or more, glabrous to puberulous. Calyx reddish, 3-7 mm long. Corolla orange to yellow, 3.5-4 cm long, glabrous, the tube ca. 1 cm long, the lobes narrowly obovate, 3 cm long. Labellum yellow, oblong-obovate when spread out, 2-3 × 1.5-2 cm, the lateral lobes rolled inward and forming a tube. Stamen narrowly elliptic, equaling or slightly exceeding the labellum, red to orange-red, yellowish at the apex, 2-2.5 cm long; anther 5-7 mm long. Ovary 3-8 mm long, glabrous to densely puberulous. Capsule ellipsoid to subglobose, 7-12 mm long, glabrous to densely puberulous at the apex; seeds black.

General distribution: Mexico, Central

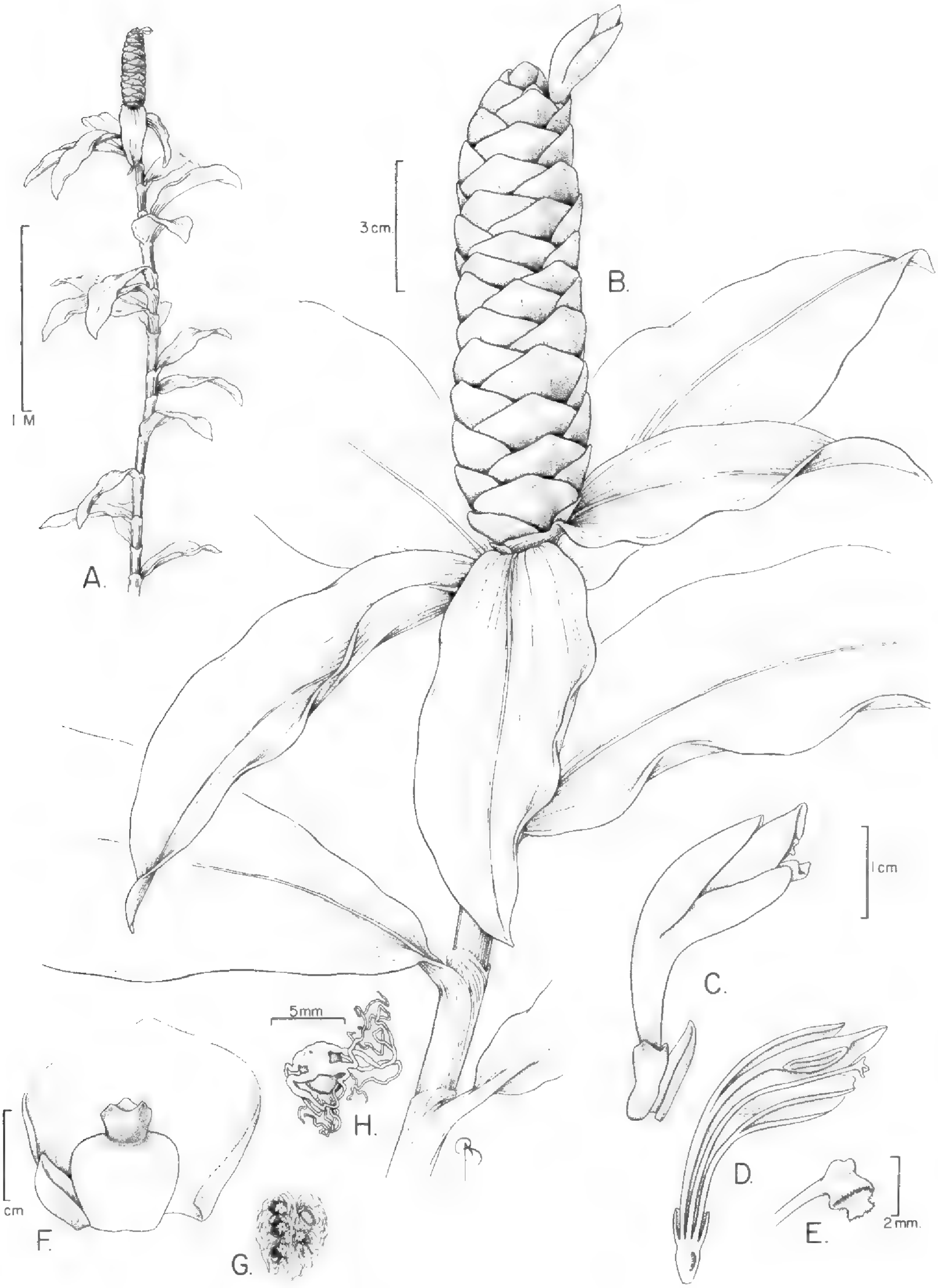


Fig. 38. A-H. *Costus scaber.* **A.** Habit. **B.** Upper part of stem with inflorescence. **C.** Flower and bracteole. **D.** L. s. of flower. **E.** Stigma. **F.** Young fruit with bract and bracteole. **G.** Seeds. **H.** Seed with aril. From Mori, S. et al. 1997. Vascular plants of central French Guiana. Mem. NYBG Vol. 76(1).

America, Hispaniola, Puerto Rico, the southern Lesser Antilles, and tropical South America to Peru, Bolivia, and Brazil.

Distribution in Puerto Rico and the Virgin Islands: Recorded as a wild plant only from Arecibo and Corozal; St. Thomas.

Selected specimens examined: PUERTO RICO: Arecibo: 0.5 km S of Biáfara, *Acevedo-Rdgz. 11703* (US). Corozal (in a "forested gully"), *Britton et al. 8357* (NY). Mayagüez: at the Agricultural Experiment Station, *Britton & Hess 2825* (NY, US). ST. THOMAS: Road 33, by entrance to Mountain Top, *Acevedo-Rdgz. 11367* (US).

4. Costus speciosus (J. König) Sm., Trans. Linn. Soc. London 1: 249. 1791; *Banksia speciosa* J. König in Retz., Observ. Bot. 3: 75. 1783. Type: Asia. *Koenig s. n.* (C-Schum.).

Costus spicatus var. [β] *pubescens* Griseb., Fl. Brit. W. I. 602. 1864. Type: St. Vincent. *Guilding s. n.* (K).

Fig. 64. F.

Plants up to 3 m tall; sheaths green, tinged reddish brown, 0.7-1.2 cm in diam., minutely puberulous to glabrous; ligules truncate, 1-2 mm long; petioles 2-5 mm long, densely puberulo-sericeous; leaf blades narrowly elliptic, 12-25 cm long, acuminate at the apex, tipped by a subulate point, cuneate to rounded at the base, the upper surface glabrous, the underside densely sericeous or puberulous and very soft to the touch. Inflorescence ovoid to broadly ovoid, 4-7 × 3-5 cm; bracts red to brownish red, narrowly ovate-triangular, acute, 2.5-3.5 × 1-2.5 cm. Calyx reddish brown to green, 2.2-2.5 cm long. Corolla yellow to pinkish white, ca. 6 cm long, minutely sericeous; tube ca. 1.5 cm long, the lobes elliptic to obovate, 4-5 cm long. Labellum white to pinkish white, 6-7 cm long, broadly obovate when spread out and up to 10 cm wide, the margins crenate; middle lobe blotched with yellow in the center. Stamen white to yellowish white, narrowly elliptic to narrowly ovate, 4.5-5 cm long with obtuse apex; anthers 1. 1 cm long. Ovary 5-10 mm long, sericeous; capsule not described.

General distribution: Native to the Indo-Malayan region, occurring from India to New Guinea; widely cultivated in the Neotropics and naturalized in the Greater and Lesser Antilles.

Distribution in Puerto Rico: Grows in disturbed moist to wet thickets and roadside banks at low to lower middle elevations (50-200 m). Recorded from Caguas, Ceiba, Naguabo, and Río Grande.

Note: The following collection was cited by Maas (1972) as *Costus speciosus* for Puerto Rico: *Wagner 415* (U).

5. Costus spicatus (Jacq.) Sw., Prodr. 11. 1788; *Alpinia spicata* Jacq., Enum. Syst. Pl. 11. 1760. Lectotype: Martinique. Jacquin, *Select. Stirp. Amer. Hist. t. 1. 1763*, designated by Maas, Fl. Neotrop. Monogr. 8: 104. 1972.

Costus cylindricus Jacq., Fragm. Bot. 54, t. 77. 1809. Type: Martinique. Jacquin, *Fragm. Bot. 54. t. 77. 1809* [1].

Plants up to 2.5 m tall; sheaths 1-2 cm in diam., glabrescent; ligules truncate, 2-10 mm long; petioles 2-10 mm long, puberulous to glabrous; leaf blades narrowly elliptic, 7-33 × 3.5-8.5 cm or more, shortly acuminate at the apex, rounded to cordate at base, glabrescent on both surfaces. Inflorescence ovoid to cylindrical, 5-27 × 3-4.5 cm; bracts greenish or reddish on the exposed part, reddish on the covered part, broadly ovate, 2-4 cm long and broad, obtuse at the apex, glabrous and coriaceous, the margin of the covered parts lacerating into fibers; bracteoles 1.7-3 cm long. Calyx 9-16 mm long. Corolla yellow to pink, 4-5 cm long, glabrous, the tube 1 cm long, the lobes narrowly obovate, 3-5 cm long. Labellum yellow, broadly oblong-obovate when spread out, 2.5-5 cm long and wide, the lateral lobes rolled inward and forming a slender tube, the margins crenulate. Stamen narrowly elliptic, 3-4 cm long; anther 7-8 mm long. Ovary 4-9 mm long, sericeous or rarely glabrous. Capsule ellipsoid, 10-15 mm long; seeds black.

General distribution: Hispaniola, Puerto Rico, and the Lesser Antilles.

Distribution in Puerto Rico: Recorded as a wild plant from Humacao; in addition, Maas (1972) cites a specimen (without locality) collected by *Boye* (S). This species is cultivated at the Botanical Garden, Río Piedras. Its occurrence as a wild plant in Puerto Rico needs further confirmation.

Common name: Puerto Rico: *Caña amarga.*

Note: [1] Howard (Fl. Lesser Antill. 3: 535. 1979) regarded Jacquin's fig. 77 as the holotype of

Costus cylindricus. However, Jacquin's original publication of this name contained two elements [Plumier's manuscript no. 5 t. 30 (cited twice through a reference to Aublet) and Jacquin's own illustration plate 77] and therefore Jacquin's fig. 77 should be considered a syntype instead. Further study of the original material is needed in order to make a sound decision of a type for this name.

Selected specimens examined: PUERTO RICO: Humacao, Pterocarpus forest, *Woodbury s.n.* (UPR).

Family 27. **CANNACEAE** *Indian-shot Family*

Cannaceae Juss., Gen. Pl. 62. 1789, *nom. conserv.*

by G. R. Proctor

Erect glabrous perennial herbs; usually with tuberous, starchy rhizomes. Leaves spirally arranged, with large simple blades having a prominent mid rib and numerous fine parallel vertical veins, the petioles forming open sheaths around the stems; ligules lacking. Inflorescence a terminal racemiform or paniculate thyrse often with several to many short, 2-flowered cymules axillary to the bracts; branches each with one large primary bract (10-30 cm long), and two branch bracts (5-20 cm long). Flowers bright-colored, bisexual, zygomorphic; individual flowers sessile or short-pedicellate; sepals 3, imbricate, equal, free, usually green or purplish; petals 3, unequal, connate at base into a short tube. Stamen one, petaloid, with a single marginal pollen-sac (theca), this more or less adnate at base to the fleshy, petaloid style and the petaloid inner staminode. Inner staminode (labellum) one, often recurved, smaller than the outer ones; outer staminodes 0-3, longer than the petals, connate at base with the labellum, style, and stamen into a tube. Septate nectar glands present. Ovary inferior, 3-locular, verrucose or tuberculate; ovules numerous. Fruit a verrucose to tuberculate, loculicidally dehiscent capsule crowned by the persistent sepals. Seeds numerous, globose to ellipsoid, very hard, black to dark brown; without an aril. A Neotropical family of a single genus and ca. 9 species, some of which have become naturalized in Africa and tropical Asia. Hybridization has produced many variants often planted for their ornamental flowers.

TYPE: *Canna* L.

References: Maas, P. J. M. & H. Maas. 1988. Cannaceae in Flora of Ecuador no. 32, 9 pp. Tanaka, N. 2001. Taxonomic revision of the family Cannaceae in the New World and Asia. Makino New Ser. 1: 1-74.

1. CANNA

Canna L., Sp. Pl. 1. 1753.

With characters as given above for the family.

LECTOTYPE: *Canna indica* L., designated by Britton, Fl. Bermuda 86. 1918.

Key to the species of *Canna*

1. Plant conspicuously glaucous; leaf blades less than 15 cm wide; flowers pure yellow; rhizomes slender, long-creeping ..... 1. *C. glauca*
1. Plant not glaucous; leaf blades usually wider than 15 cm; flowers red to orange, but never pure yellow; rhizomes short, tuberous. 2
   2. Bracts persistent; flowers usually crimson (rarely yellowish orange); seeds globose, 4-5 mm in diam. ..... 2. *C. indica*
   2. Bracts caducous; flowers pure orange; seeds narrowly ellipsoid, 4-7 × 2.5-4 mm..... 3. *C. jaegeriana*

1. Canna glauca L., Sp. Pl. 1. 1753. Type: Type: To be sought among several syntypes.*

Plants gregarious in wet, marshy sites; rhizomes long-creeping, fleshy, to 1.5 cm thick, beset with numerous roots; stems up to 1.5 m tall or more. Sheath and leaf blades glaucous; blades narrowly ovate to narrowly elliptic, 30-50 × 3-15 cm, very gradually narrowed toward the apex, the base narrowly cuneate. Inflorescences usually simple (rarely branched), bearing 2-flowered cincinni of short-pedicellate light yellow flowers, the pedicels up to 1 cm long (in fruit). Floral bracts ovate to broadly ovate, 0.7-2.5 cm long; bracteoles broadly ovate to ovate-triangular, 0.3-2 cm long. Sepals narrowly elliptic-triangular, 1-2.5 cm long. Corolla 7-9 cm long, the tube ca. 2 cm long, the lobes narrowly ovate, 5-7 cm long. Outer staminodes 3, pale yellow, narrowly obovate to narrowly elliptic, 8-10 cm long (including basal tubular part); inner staminode (labellum) pale yellow, strongly recurved, narrowly elliptic to narrowly obovate, 7.5-8 cm long. Stamen pale yellow, the free part 3.5-4.5 cm long. Style yellow, the free part 4-5 cm long. Capsule ellipsoid to globose, 2-6 cm long.

General distribution: Widespread throughout the Neotropics.

Distribution in Puerto Rico: Widespread but not common, occurring in wet fresh-water habitats near sea level. Recorded from Cabo Rojo, Carolina, Guánica, Mayagüez, San Juan, Vega Alta and Vega Baja.

Common names: Puerto Rico: *Maraca amarilla, Maraca boba, Maraca de pantano.*

Note. * A lectotypification made by N. Tanaka (Makinoa New Ser. 1: 53. 2001) is erroneous because the proposed lectotype is not part of the original material.

Selected specimens examined: Puerto Rico: Cabo Rojo: *Sintenis 665* (US). Guánica: Guánica Lake, *Sargent 264* (US). Mayagüez: Road from Mayagüez to Joyuda, *Underwood & Griggs 130* (US). San Juan: Río Piedras, *Stevenson 3444* (US). Vega Alta: Bo. Sabana, *Proctor 44331* (US). Vega Baja: Bo. Cibuco, *Proctor et al. 45562* (US).

2. Canna indica L., Sp. Pl. 1. 1753. Lectotype: *Herb. van Royen* 912. 356-390 (L), designated by Maas in C.E. Jarvis et al., Regnum Veg. 127: 29. 1993.

Canna lambertii Lindl., Bot. Reg. 6: t. 470. 1820. Type: Trinidad. Lindley, *Bot. Reg. 6: t. 470. 1820.* Based on a plant grown by Lambert from seed collected in Trinidad.

Canna sylvestris Roscoe, Monandr. Pl. Scitam. t. 10. 1828. Lectotype: Tropical America. *Herbarium Hookerianum, M1818/72 42* (K), designated by N. Tanaka, Makinoa New Ser. 1: 35. 2001.

Canna portoricensis Bouché, Linnaea 12: 147. 1838. Type: Puerto Rico; *Moritz s.n.* (B, destroyed; L?).

Canna coccinea sensu Britton & P. Wilson, 1923, non Miller, 1768.

Figs. 39. A-F; 64. G

Rhizomes stout, more or less tuberous; stems 1-2 m tall, with glabrous leaf sheaths; leaf blades mostly narrowly ovate to narrowly elliptic, 20-60 × 10-30 cm, the apex acute to shortly acuminate, the base rounded to narrowly cuneate. Inflorescence simple or branched, bearing several solitary flowers or 2-flowered cincinni. Floral bracts ovate to obovate, 1-3 cm long; bracteoles (narrowly) ovate-triangular, 0.5-1.5 cm long; sepals ovate to narrowly ovate, 0.7-2 cm long. Corolla red (rarely yellow), 4-6.5 cm long, the tube 1-2 cm long, the lobes linear, 3-5 cm long. Outer staminodes 2 or 3, red or yellow, narrowly elliptic to narrowly obovate, 5-7.5 cm long, with obtuse or emarginate apex. Inner staminode (labellum) mostly red and dotted yellowish or pinkish at base (rarely completely yellow), recurved, narrowly oblong-ovate, 4.5-6.5 cm long, up to 1 cm wide, the apex usually emarginate. Stamen 4-6 cm long. Style 4.5-6.5 cm long. Capsules ellipsoid to subglobose, 1.5-4 cm long; seeds black, 4-5 mm in diam.

General distribution: Very common throughout the more moist parts of tropical and subtropical America; widely naturalized in tropical Asia and Africa. Often cultivated and escaping from cultivation. Readily hybridizes with other species to form a wide spectrum of horticultural variants with showy flowers.

Distribution in Puerto Rico and the Virgin Islands: Common in moist shaded secondary vegetation from near sea level to over 700 m elevation. Recorded from Adjuntas, Aibonito, Añasco, Arecibo, Barranquitas, Barceloneta, Carolina, Cataño, Cayey, Ciales, Coamo, Florida, Guaynabo, Humacao, Jayuya, Loíza, Lares,

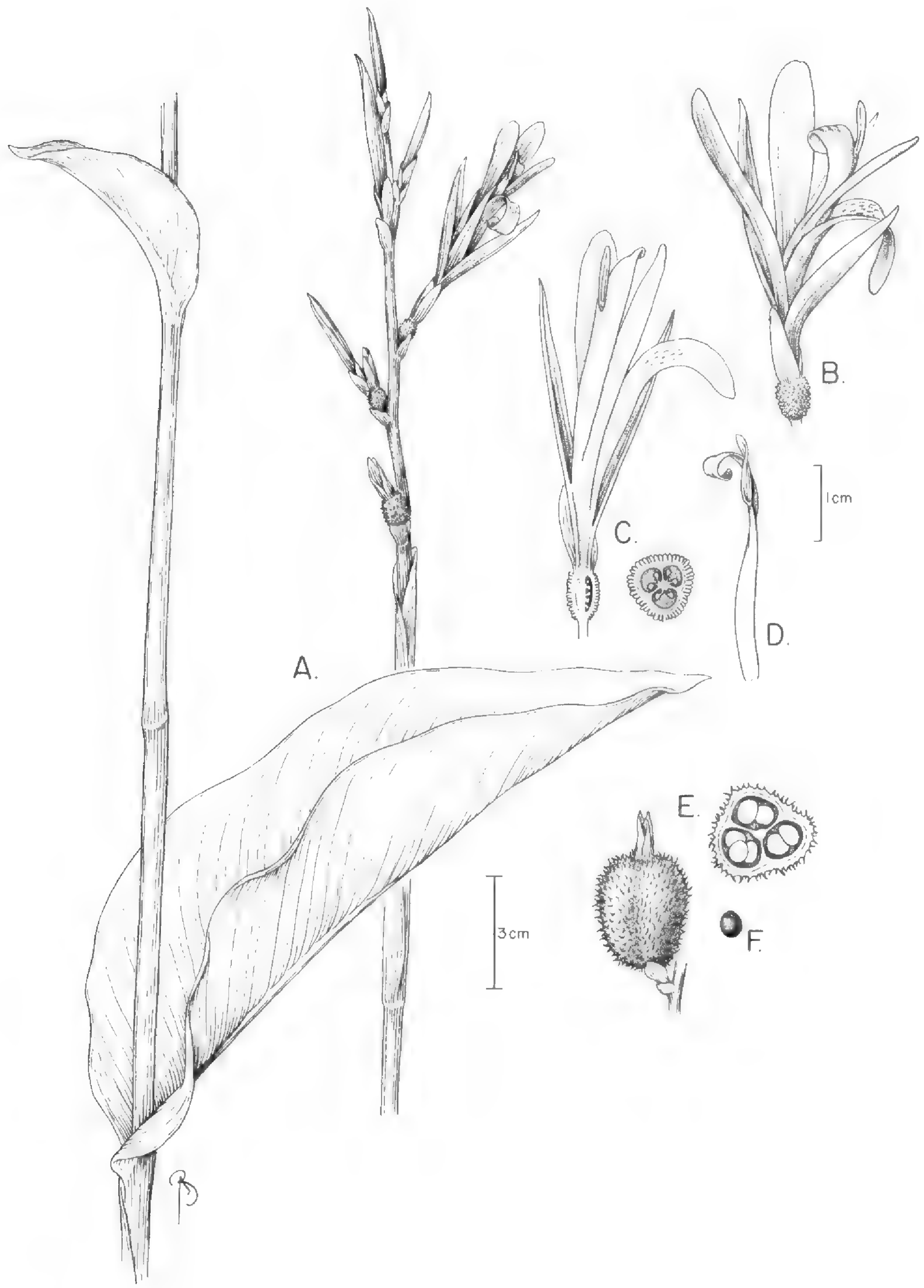


Fig. 39. A-F. *Canna indica.* **A.** Part of stem and inflorescence. **B.** Flower. **C.** L. s. of flower (left) and transverse section of ovary (right). **D.** Stamen. **E.** Fruit and c.s. of fruit. **F.** Seed. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

Maricao, Mayagüez, Naguabo, Patillas, Ponce, Rincón, San Germán, San Juan, San Lorenzo, San Sebastián, Toa Baja, and Utuado; St. Croix and St. John.

Common names: Puerto Rico: *Bandera española, Maraca, Maraca morada, Maraca roja.*

Note: The synonyms cited above for *Canna indica* are names thought by Britton & P. Wilson (1924) to represent valid species. However, this rather short list includes only a small fraction of the total synonymy of this species, which was characterized by Howard (1979, p. 541) as "a nightmare to every taxonomist".

Selected specimens examined: PUERTO RICO: Adjuntas: ca. Saltillo, *Sintenis 4015* (US). Aibonito: Between Aibonito and Cayey, *Heller & Heller 518* (US). Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10705* (US-2). Cataño: *Goll 997* (US). Guaynabo: Bo. Sonadora, *Proctor & Thomas 44555* (US-2). Lares: Bo. Callejones, *Proctor 44463* (US). Maricao: Bo. Montoso, *Kennedy et al. 4783* (US). Ponce: *Prey 83* (US). San Juan: Río Piedras, *Stevenson 1224* (US). San Sebastián: *Sargent 277* (US). Utuado: Road from Utuado to Lares, *Underwood & Griggs 84* (US). ST. JOHN: Reef Bay Quarter, Bordeaux Mountain, *Acevedo-Rdgz. & Siaca 3869* (US).

3. Canna jaegeriana Urb., Repert. Spec. Nov. Regni Veg. 15: 102. 1917. Type: Haiti. *Jaeger 165* (holotype: B, destroyed; lectotype: K; isolectotypes: LE, MO), designated by N. Tanaka, Makinoa, ser. 1: 46. 2001.

Canna pertusa Urb., Repert. Spec. Nov. Regni Veg. 15: 101. 1917. Type: Puerto Rico; Utuado. *Sintenis 6494* (holotype: L).

Rhizomes stout, tuberous; stems 1-5 m tall, with the sheaths glabrous or lanuginose. Leaf blades narrowly elliptic to narrowly ovate, 50-100 × 13-38 cm, shortly acuminate at apex, cuneate at base, glabrous on upper (adaxial) side, glabrous or slightly lanuginose beneath. Inflorescence simple or branched, with cincinni 1-or 2-flowered, the pedicels up to 0.5 cm long in flower, to 1 cm long in fruit. Bracts caducous, the primary bracts 10-30 cm long; branch bracts 2.5-13 cm long; flower bracts broadly ovate to deltate, 0.1-0.18 cm long; bracteoles narrowly triangular to deltate, 0.2-2 cm long. Flowers orange, 5-6.5 cm long, the tube 0.5-2 cm long, the lobes 2.5-4.5 cm long Outer staminodes 3 or 4, obovate-elliptic, with apex entire or emarginate, 5-6.5 cm long. Inner staminode (labellum) slightly reflexed. Capsules ellipsoid, 4.5-10 cm long, densely covered by pinkish tipped green papillae; seeds shiny black, narrowly ellipsoid, 4-7 × 2.5-4 mm.

General distribution: Hispaniola, Puerto Rico, and western South America on forested mountain slopes and stream sides at mostly 300-2200 m elevation.

Distribution in Puerto Rico: Very rare; recorded from Utuado and Villalba.

Common name: Puerto Rico: *Maraca montuna.*

Selected specimens examined: PUERTO RICO: Utuado: Mt. Morales, *N.L. Britton & Cowell 827* (US). Villalba: Vicinity of Ala de la Piedra above Villalba, *E.G. Britton & Brown 6228* (US).

Cultivated Species

Canna edulis Ker Gawl. and *Canna lutea* Mill. were listed by Britton & P. Wilson (1923) as cultivated in the Virgin Islands.

Family 28. **MARANTACEAE** *Arrowroot Family*

Marantaceae Petersen in Engler & Prantl, Nat. Pflanzenfam. 2, Abt. 6: 33. 1888, *nom. conserv.*

by G. R. Proctor

Perennial herbs with creeping rhizomes (and sometimes also with starchy tubers), acaulescent or with more or less elongate stems. Leaves distichous, vaginate at base, differentiated into sheath, petiole proper (often missing), pulvinus, and blade; blades with a prominent mid rib and numerous, closely set lateral veins that fuse near the blade margins and are interconnected by minute cross veinlets. Inflorescence varying from a simple spike to a complex spiciform thyrse, or with aggregates of 1- or 2-flowered cymules

in the axils of spathe-like bracts. Flowers bisexual, epigynous, each arising from between a spathe-like unit of 2 bracts; sepals 3, mostly free and equal; petals 3, united below into a tube; usually contorted, unequal and often cucullate. Fertile stamen 1, with 1-locular anther; staminodes 2, free or connate with the fertile stamen, petaloid. Ovary inferior, 1- to 3-locular, with a single ovule in each locule; style recurved, simple. Fruit capsular, nutlike, or fleshy; seeds solitary, hard, arillate. A chiefly Neotropical family of 30 genera and more than 400 species. The family is easily distinguished from the related Zingiberaceae by the swollen pulvinus at the junction of the petiole with the leaf blade.

TYPE: *Maranta* L.

References: Howard, R. A., Fl. Lesser Antill. 3: 542-550. 1979. Kennedy, H., L. Andersson and M. Hagberg. 1988. 224. Marantaceae. *In:* G. Harling & L. Andersson (eds.), Fl. Ecuador 32: 14-136.

Key to the genera

1. Flowers borne in bracteate spikes; ovary and fruit 3-locular ..... 1. *Calathea*
1. Flowers borne in an open, somewhat diffuse inflorescence; ovary and fruit 1-locular. 2
   2. Flowers white, the terminal one long-pedicellate, erect; exterior staminodes 2; leaves not over 28 cm long and not more than 10 cm wide ..... 2. *Maranta*
   2. Flowers purplish, sessile, pendent, exterior staminode 1; leaves 30-60 cm long, up to 25 cm wide ..... 3. *Thalia*

1. CALATHEA

Calathea G. Mey., Prim. Fl. Esseq. 6. 1818.

Perennial herbs with rhizomes; leaves all basal or both basal and cauline; aerial stems usually unbranched. Leaves ovate to elliptic, rarely obovate, the apex obtuse to rounded, or sometimes acuminate, glabrous or pubescent. Inflorescence terminal on a leafy shoot, or sometimes terminating a separate non-leafy scape, simple or synflorescence of several spikes, the latter often clustered. Bracts spirally arranged or distichous and green, white, or variously colored, usually persistent; bracteoles usually present, membranous. Flowers paired, usually sessile, opening or remaining closed, rarely cleistogamous; outer staminode 1 (rarely none); corolla tube elongate; ovary with 3 fertile locules, each with 1 ovule. Capsules 3-locular, 3-seeded; seeds with a basal, usually white aril. A Neotropical genus of more than 300 species, only two of which are indigenous to Puerto Rico. Many species are grown for their ornamental foliage, and few of these sometimes escape and become naturalized.

LECTOTYPE: *Calathea discolor* G. Mey., *nom. illeg.* (≡ *Maranta casupo* Jacq.), designated by Leman, Bull. Sci. Soc. Philom. Paris 1820: 7. 1820.

Key to the species *Calathea*

1. Spikes solitary, ellipsoid or oval, mostly 5-8 cm long, bracts closely spiral; corolla white ..... 1. *C. allouia*
1. Spikes 2-6 in a synflorescence, mostly 8-16 cm long, subcylindric or rectangular. 2
   2. Spikes flattened-rectangular; bracts 16-34, distichous, light yellow or orange-yellow; corolla white ..... 2. *C. crotalifera*
   2. Spikes subcylindric; bracts 8-12, spirally arranged (but often appearing distichous in pressed specimens), bronze to reddish brown; corolla yellow ..... 3. *C. lutea*

1. Calathea allouia (Aubl.) Lindl., Bot. Reg. 14: t. 1210. 1829; *Maranta allouia* Aubl., Hist. Pl. Guiane 3. 1775. Lectotype: Martinique. *Plumier, manuscript no. 5: t. 35*, designated by H.A. Kennedy in G. Harling and L. Andersson (eds.), Fl. Ecuador 32: 87. 1988.

Plants rather robust, to 1.5 m tall. Leaf blades oblong to ovate-oblong, 30-50 × 8-15 cm, pale beneath, the apex short-acuminate, the base acute to rounded and somewhat inequilateral. Peduncles glabrous or pilose, each arising from a leaf-axil; bracts ovate, 1.5-3.5 cm long, green, membranous, glabrous or appressed-pubescent. Sepals lanceolate, obtuse, 7 mm long; corolla tube 2.5 cm long. Capsule 8 mm long.

General distribution: Mexico, Central America, Greater Antilles (except Cuba), Lesser Antilles, and Northern South America. Some of this distribution may not be natural, as this species is cultivated for its edible tubers and easily escapes.

Distribution in Puerto Rico: Naturalized in moist, sheltered, disturbed habitats at middle elevations (300-500 m). Recorded from Cayey, Hatillo, Maricao, and Yabucoa but probably occurs more widely.

Common names: Puerto Rico: *Lerenes, Llerenes.*

Selected specimens examined: PUERTO RICO: Cayey: Guavate, *Liogier et al. 36763* (UPR). Hatillo: Bo. Bayaney, *Proctor 44086* (US). Maricao: *Sintenis 492* (US). Yabucoa: Cerro de Pandura, Santa Elena, *Liogier et al. 30980* (UPR).

2. Calathea crotalifera S. Watson, Proc. Amer. Acad. Arts 24: 86. 1889. Lectotype: Guatemala; Izabal. *Watson 429* (GH), designated by Standley & Steyermark, Fieldiana, Bot. 24: 210. 1952.

Calathea insignis Petersen in Martius, Fl. Bras. 3 (3): 124. 1890. Syntypes: Central America. *Oersted s. n.* (C, F, photo at XAL), and Panama; Canal Zone, Gatun, *Wagner s.n.* (M).

Calathea quadratispica Woodson, Ann. Missouri Bot. Gard. 26: 278. 1939. Type: Panama; Bocas del Toro. *Woodson et al. 1913* (holotype: MO).

Caulescent herb 1.5 m tall or more, bearing 2-5 basal leaves and 1 cauline leaf above a stem internode; leaf blades ovate, chartaceous, 30-90 × 15-55 cm, rounded to minutely acuminate at the apex, the base rounded or subtruncate, lighter beneath, often tinged purple along margins; petioles elongate. Inflorescence rarely simple, usually a synflorescence of 2-4 spikes, the first one terminal, subsequent ones fasciculate in the axil of the cauline leaf. Spikes rectangular, laterally flattened, 10-25 × 3.5-6.5 cm, on peduncles 11-55 cm long, these minutely appressed-tomentose at the apex. Bracts conduplicately folded, broadly reniform, glabrous or minutely tomentulose at base and along margins. Sepals glabrous, 12-21 mm long; corolla tube pilose to glabrous, mostly 18-25 mm long; staminal tube 3-5 mm long, the lobes subequal; outer staminode obovate, emarginate, cream to yellow, occasionally tinged purple, 9-13 mm long. Ovary glabrous, ca. 3.5 mm long. Capsules obovoid, rounded at apex, smooth, 11-14 mm long, with persistent sepals; seeds dark blue, 6-7.5 mm long, with white aril.

General distribution: widespread and common in moist lowlands of Central and tropical South America.

Distribution in Puerto Rico: Recorded only from Río Grande, where it has become naturalized in secondary forest. Its time and mode of introduction to Puerto Rico are not known.

Selected specimens examined: PUERTO RICO: Río Grande: El Verde area, secondary rain forest, elevation 210-240 m, *Proctor 50414* (SJ).

3. Calathea lutea (Aubl.) Schult., Mant. 1: 8. 1822; *Maranta lutea* Aubl., Hist. Pl. Guiane 4. 1775. Type: Plumier, *manuscript no. 5: t. 21, 22.*, fide H.A. Kennedy in G. Harling and L. Andersson, Fl. Ecuador 32: 87. 1988.

Fig. 64. H

Stout caulescent herb mostly 2-3 m tall, with 3-7 basal leaves and 1 (2) cauline leaves; leaf blades elliptic to ovate or sub-rotund, 30-150 × 18-60 cm, obtuse, broadly rounded, or apiculate at the apex, rounded or very shortly decurrent at the base, usually glabrous, the upper surface green, the lower surface usually pruinose, sometimes coated with a white, wax-like powder that falls off in flakes. Inflorescence compound, of 2-5 more or less peduncled spikes 8-17 cm long, subcylindrical (broadly elliptic in cross-section), 2-5 cm thick or more; bracts usually 5-12 (rarely more), spirally arranged, broadly elliptic to depressed-elliptic, retuse at apex, 3.7-5.8 cm long, glabrous or nearly so. Sepals membranous, linear, unequal, 6-11 mm long; corolla tube curved, 25-34 mm long, the lobes strongly recurved, elliptic to obovate, 14-18 mm long. Ovary smooth, glabrous, 3-3.5 mm long.

Capsule obovoid, rounded at apex, orange, 14-15 mm long; seed 1, with orange ail.

General distribution: Central America, Jamaica, Puerto Rico, Lesser Antilles, Trinidad, and tropical South America.

Distribution in Puerto Rico: Recorded from Fajardo, Luquillo, Río Grande, and San Lorenzo.

Common names: Puerto Rico: *Hoja de sal, Pámpano.*

Note: The large leaves of *Calathea lutea* bear on their underside a white, flaky material which in Brazil is called "cauassu wax". This is said to have considerable commercial value in the making of high-quality polishes.

Selected specimens examined: PUERTO RICO: Luquillo: Río de Mameyes, *Eggers 1169* (US). Río Grande: Luquillo Mountains, Caribbean National Forest, *Acevedo-Rdgz. et al. 10767* (UPRRP, US); Sierra de Luquillo, *Sintenis 1327* (US). San Juan: Río Piedras, *Stevenson 528* (US).

Cultivated Species

Calathea zebrina (Sims) Lindl., a native of Brazil, is cultivated in Puerto Rico but known only to have escaped by only a single specimen record made in a ravine in wet forest at Jajome Arriba (*Liogier & Liogier 30623*).

Excluded Species

Calathea ornata (Lindl.) Körn. Britton & P. Wilson (1923) cited this species, a native of northern South America, as being cultivated in Puerto Rico; however, no specimen record has been seen by the present writer.

2. MARANTA

Maranta L., Sp. Pl. 2. 1753.

Perennial herbs with rhizomes. Leaves basal and often cauline; cauline leaves (if present) separated by distinct internodes. Spathes long-persistent, usually more or less fibrous. Inflorescence loosely and divaricately paniculate, the pedunculate branches consisting of 2-6, 2-flowered cymules, the terminal flower of each pair long-pedicelled, the lower flower sessile or nearly so. Sepals 3, equal; corolla tubular and usually enlarged or gibbous at the base, the 3 lobes subequal and somewhat hooded at the apex, the whole flower very irregular in appearance. Two exterior staminodes petal-like, obovate and conspicuous, the single anther free from its petaloid filament. Capsule more or less oblique; seed 3-angled, rugose, arillate. A Neotropical genus of about 30 species.

TYPE: *Maranta arundinacea* L.

Reference: Andersson, L. 1986. Revision of *Maranta* subgen. *Maranta* (Marantaceae). Nordic J. Bot. 6: 229-256.

Key to the species of *Maranta*

1. Plants acaulescent, less than 1 m tall, with specialized starch-storing tubers produced on the roots, dying back during dry season; leaf blades pubescent on the underside ..... 1. *M. arundinacea*
1. Plants caulescent, 1-4 m tall; not producing specialized tubers on the roots, not dying back during dry season; leaf blades glabrous beneath (or with hairs only on the mid rib) ..... 2. *M. gibba*

1. Maranta arundinacea L., Sp. Pl. 2. 1753. Lectotype: a specimen (Maranta 1) in the Clifford Herbarium (BM), designated by L. Andersson, Nordic J. Bot. 6: 739, 740. 1986.
Maranta indica Tussac, Fl. Antill. 1: 183, t. 26. 1808. Type: Jamaica. *Tussac s.n.* (holotype: probably at P). If no original material exists, this taxon can be typified by the figure cited.

Acaulescent perennial herb 30-80 (-100) cm tall, commonly cultivated and escaping; rhizomes producing specialized tuberous branches which store starch, these covered with whitish scale-like cataphylls; whole plant dying back to the rhizome during dry seasons. Leaves basal except for a few produced at forks of the elongate stem-like inflorescence; petioles more or less hirsute, up to 20 cm long; pulvinus hirtellous or hirsute above, usually glabrous beneath, 0.2-1.5 cm long on basal leaves; leaf blades narrowly ovate to ovate, 4-27 ×

2.8-7 cm, acuminate at the apex, rounded or truncate at the base, glabrous on upper surface. Inflorescence diffusely branched, making up the entire stem-like aerial portion of the plant; flowers paired; sepals 10-15 mm long; corolla white, the tube 10-15 mm long, the lobes 8-10 mm long; outer staminode obovate, emarginate, the inner one shorter. Ovary glabrous or pubescent on the angles. Seed 8-9 mm long, transversely ridged, pale red with yellow aril.

General distribution: Numerous records from Mexico, Central America, the Greater and Lesser Antilles, and northernmost South America; apparently absent from Brazil. An unknown number of recorded sites may be based on plants escaped or naturalized after cultivation.

Distribution in Puerto Rico and the Virgin Islands: Naturalized on moist stream banks and also sometimes in shaded ditches and along roadsides at low to lower middle elevations (10-400 m). Recorded from Cataño, Cayey, Fajardo, Maricao, Mayagüez, Naguabo, San Juan, and San Sebastián; St. Croix.

Common names: Puerto Rico: *Amaranta, Maranta, Pitisilén, Yuquilla.*

Selected specimens examined: PUERTO RICO: Cataño: *Goll 998, 1065* (US). Cayey: *Sintenis 2208* (US). Maricao: *Sintenis 490* (US). Mayagüez: *Underwood & Griggs 112* (US). San Juan: Río Piedras, *Stevenson 3027* (US). San Sebastián: *Sargent 412* (US). ST. CROIX: Big fountain garden, *Ricksecker 445* (US).

2. Maranta gibba Sm. in Rees, Cycl. 22. 1819. Lectotype: a specimen collected in the Liverpool Botanical Garden in 1810 (LIV), designated by L. Andersson, Nordic J. Bot. 6: 749. 1986.

Maranta divaricata sensu authors, non Roscoe, 1902.

Caulescent perennial herb with stems 1-4 m tall; rhizomes strongly fibrous and woody but lacking tuberous starch-filled offshoots. Mature plants with only bladeless sheaths at the base; first stem internode 1-2 m long, terminated by a node bearing either a sheath or a normal leaf blade; plants with multiple branches above the first node, the branches often long and straggling through surrounding vegetation; most branches eventually terminating in an inflorescence. Leaves without petioles, with hirsute pulvinus 1-6 mm long; leaf blades narrowly ovate to ovate, 3.2-20 × 2-9 cm, acuminate at the apex, rounded at the apex, glabrous on both surfaces except sometimes a few coarse hairs on the mid rib. Inflorescences terminal on leafy branches, simple or compound. Each inflorescence with 1 or 2 spathes; spathes glabrous or subglabrous, 2.7-4.6 cm long. Inflorescence composed of 1 or 2 cymules, each cymule with a peduncle 4-5.5 cm long and two unequal pedicels varying from 0.1 to 2 cm long. Sepals greenish, glabrous, 12-14 mm long; corolla and staminodes white; corolla tube 15-18 mm long, the lobes 8-10 mm long; outer staminodes subequal, 14-22 mm long; cucullate staminode 9-10 mm long; ovary densely sericeous, with indument more or less completely covering the surface. Capsules nearly ellipsoid to subglobose, but very oblique, 11-12 mm long when fresh, smaller when dry. Seed rugose, 6-8 mm long.

General distribution: Southern Mexico to Nicaragua, Virgin Islands, St. Vincent, Tobago, Trinidad, and northernmost South America from Ecuador to the Guianas.

Distribution in the Virgin Islands: Recorded only from St. Thomas by a single collection made long ago. The continued existence of this species in St. Thomas is in doubt and needs to be investigated.

3. THALIA

Thalia L., Sp. Pl. 1193. 1753.

Erect perennial herbs of marshy or fresh-water aquatic habitats, rhizomes very short, branched. Leaves chiefly in a basal cluster, with long petioles. Inflorescence a branched, panicle-like (rarely simple) synflorescence terminal on a tall peduncular stem. Flowers in pairs, sessile within 2-valved bract-like spathes, these deciduous, shed with the unfertilized flowers or mature fruits, leaving a naked more or less zigzag rachis below the currently flowering apical portion of the spike. Sepals 3, equal, very small,

membranous; corolla tube obsolete or nearly so, the lobes membranous, more or less cucullate at the apex; outer staminode petaloid, conspicuous, very irregular. Ovary 1-locular with 1 ovule; style helically twisted, adnate to the base of the staminal tube; stigma 2-lipped, appendaged on the back. Capsule globose or oblong-obovoid, indehiscent, with very thin pericarp which is more or less papery when dry. Seed smooth, ellipsoid, with small but distinct aril. A Neotropical genus of about 7 species, with one species now widely naturalized in tropical Africa.

TYPE: *Thalia geniculata* L.

Reference: Andersson, L. 1981. Revision of the *Thalia geniculata* complex (Marantaceae). Nordic J. Bot. 1: 48-56.

1. Thalia geniculata L., Sp. Pl. 1193. 1753; *Maranta geniculata* (L.) Lam., Tabl. Encycl. 1: 9. 1791. Lectotype: Plumier (Burman ed.), *Pl. Amer. t. 58, fig. 1. 1755*, designated by L. Andersson, Nordic J. Bot. 1: 55. 1981.

Thalia angustifolia C. Wright ex Griseb., Cat. Pl. Cub. 256. 1866. Lectotype: Cuba; Nueva Filipina. *Wright 3279* (BM), designated by L. Andersson, Nordic J. Bot. 1: 55. 1981.

Thalia trichocalyx Gagnep., Bull. Soc. Bot. France 51: 180. 1904. Lectotype: French Guiana. *Richard s. n.* (P), designated by L. Andersson, Nordic J. Bot. 1: 55. 1981.

Plants 1-3 m tall, usually glabrous or nearly so; basal leaves long petiolate, sheathing at base and at the apex with a cylindrical pulvinus 1.5-2.4 cm long; leaf blades ovate to oblong, elliptic or lanceolate, mostly 30-60 cm long, up to 25 cm wide, acute or acuminate at the apex, rounded at the base; cauline leaves (if present) smaller and sessile; all leaves often somewhat glaucous beneath. Flowers borne in pairs on the zigzag rachis of a spike; spikes several to many in a compound panicle-like synflorescence; spathes glabrous to densely villous, 1-2.4 cm long; sepals glabrous or more or less setose outside, 0.5-2 mm long; corolla 6-11 mm long; outer staminode lavender, 15-20 mm long, 5-10 mm broad. Capsule oblong-obovoid, 7-10 mm long; seed 5-10 mm long, with a small but evident aril.

General distribution: Southeastern United States, Mexico, Central America, Greater Antilles, and northern South America; also common and widespread in tropical Africa, where it is believed to have been introduced.

Distribution in Puerto Rico and the Virgin Islands: This species is mostly confined to fresh-water habitats near sea level. It has been obliterated from many sites by urban development and the draining of wetlands. Recorded from Añasco, Arecibo, Carolina, Cataño, Manatí, Mayagüez, Moca, Río Grande, and San Juan; St. Croix.

Selected specimens examined: PUERTO RICO: Añasco: *Sintenis 5602* (US). Arecibo: *Sargent B20* (US). Manatí: Bo. Tierras Nuevas Saliente, *Proctor & Díaz 42172* (US-2). Mayagüez: *N.L. Britton 2365* (US).

CULTIVATED GENERA

Myrosma cannifolia L. f. is cited by Liogier & Martorell (1982) as cultivated in Puerto Rico.

Family 29. **BROMELIACEAE** *Pineapple Family*

Bromeliaceae Juss., Gen. Pl. 49. 1789, *nom. conserv.*

by. J. A. Cedeño-Maldonado

Epiphytic, lithophytic or terrestrial perennial herbs; rhizomatous or sometimes stoloniferous; roots usually present, but functioning only as support in epiphytic species. Stems well-developed or short,

sometimes wanting, erect to arching or pendent, often bracteate. Leaves simple, sheathing at base, usually in rosettes which are often water-impounding; blades linear, lanceolate, or rarely ovate, thick and usually stiffened, often with stalked, peltate, water-absorbing scales, margins spinose, serrate or entire, the apex sometimes terminated by a thorn. Inflorescences terminal or rarely lateral, of simple or compound panicles, racemes, spikes, or heads, rarely with solitary flowers, the axes with distichous or spirally-arranged flowers; bracts conspicuous, usually present in compound inflorescences. Flowers 3-merous, bisexual or functionally unisexual, actinomorphic or rarely zygomorphic, often showy; sepals 3, free or connate; petals 3, free or connate; stamens 6, in 2 series of 3, the filaments free or fused to the petals; anthers basifixed or peltate, introrse; ovary superior or inferior, 3-locular; placentation axile; style slender, with 3 stigmatic branches or lobes. Fruit a dehiscent septicidal or less often loculicidal capsule or berry. Seeds 1-many per locule, winged, caudate, plumose, or unappendaged. A primarily Neotropical family of 56 genera and ca. 3,000 species distributed from the southeastern United States to southern South America with one species native to tropical West Africa.

Type: *Bromelia* L.

References: Holst, B. K. 1997. Bromeliaceae. Pp. 548-676. *In:* J. A. Steyermark, P.E. Berry, & B. Holst (eds.). Flora of the Venezuelan Guayana. Missouri Botanical Garden Press, St. Louis, Missouri. Howard, R. A. 1979. Bromeliaceae. Flora of the Lesser Antill. 3: 404-426. Arnold Arboretum of Harvard University, Jamaica Plain, MA. Proctor, G. R. & J. A. Cedeno-Maldonado. 1999. New Bromeliaceae from Puerto Rico. Harvard Pap. Bot. 4 (1): 111-118. Smith, L. B. & R. J. Downs. 1974. Pitcairnioideae (Bromeliaceae). Fl. Neotrop. Monogr. 14 (1): 1-658. Smith, L. B. & R. J. Downs. 1977. Tillandsioideae (Bromeliaceae). Fl. Neotrop. Monogr. 14 (2): 663-1492. Smith, L. B. & R. J. Downs. 1979. Bromelioideae (Bromeliaceae). Fl. Neotrop. Monogr. 14 (3): 1493-2142. Utley, J. F. 1994. Bromeliaceae. Pp. 89-156. *In*: G. Davidse, M. Sousab, & A. O.Chater (eds.). Flora Mesoamericana. Vol. 6. Utley, J. F., K. Burt-Utley & M. J. Huft. 2001. Bromeliaceae. *In*: W. D. Stevens, C. Ulloa-Ulloa, A. Pool & O. M. Montiel (eds.). Flora of Nicaragua, Monographs in Systematic Botany 85 (1): 460-495. Missouri Botanical Garden Press, St. Louis, Missouri. Zanoni, T. A., M. M. Mejia P., and R. W. Read. 1986. Notas sobre la flora de la Isla Espanola. I. Bromeliaceae. Moscosoa 4: 54-104.

Key to the genera

1. Leaves with spiny margins 2
   2. Plants terrestrial; sterile portion of the scape short, stout, to about 18 cm long 3
      3. Plants small to medium sized; leaves to 1 m long; inflorescence simple; gynoecium and bracts adnate to axis to form a fleshy compound fruit ..... 2. *Ananas*
      3. Plants large; leaves to 2 m long; inflorescence compound; gynoecium free, fruits distinct berries ..... 3. *Bromelia*
   2. Plants epiphytic, lithophytic or terrestrial; sterile portion of the scape elongate, more than 20 cm long 4
      4. Leaf blades 1-2 cm wide; fruits capsules ..... 7. *Pitcairnia*
      4. Leaf blades more than 2 cm wide; fruits baccate 5
         5. Inflorescence simple or compound; spikes cylindrical; flowers and fruits widely spaced; petals without basal appendages ..... 1. *Aechmea*
         5. Inflorescence compound; spikes cone-like; flowers & fruits congested; petals with basal appendages ..... 6. *Hohenbergia*
1. Leaves with entire margins 6
   6. Plants evidently caulescent, with elongate branching stems; leaves to 8 cm long but usually less ..... 8. *Tillandsia* (in part)
   6. Plants acaulescent or with very short, unbranched stems; leaves usually more than 8 cm long 7
      7. Inflorescences simple 8
         8. Inflorescences polystichously-flowered or corymbiform 9

9. Leaf sheaths slightly enlarged or indistinct, leaf apex obtuse to rounded and apiculate; scape bracts much shorter than internodes; petals free; fruit ovoid ..... 4. *Catopsis*
9. Leaf sheaths distinctly enlarged, leaf apex acute to acuminate; scape bracts equaling or usually much longer than the internodes; petals connate; fruits cylindrical-ellipsoid or fusiform ..... 5. *Guzmania*
8. Inflorescences distichously- or secundly-flowered 10
10. Plants large; leaves 50-100 cm long; blades 5-8 cm wide; scape to 2 m long; capsule 4-6 cm long ..... 9. *Vriesea*
10. Plants smaller, all other parts smaller than above 11
11. Leaf blades usually reddish green, transversely red-banded; petals with basal appendages; stigma cupulate (three apical, capitate, cup-shaped untwisted lobes without papillae) ..... 10. *Werauhia* (in part)
11. Leaf blades green, concolorous or with white transverse stripes; petals unappendaged; stigma never cupulate ..... 8. *Tillandsia* (in part)
7. Inflorescences compound 12
12. Branches of the inflorescence polystichously-flowered; fruits ovoid ..... 4. *Catopsis*
12. Branches of the inflorescence not polystichously-flowered; fruits cylindrical-ellipsoid or fusiform 13
13. Petals with basal appendages; stigma cupulate ..... 10. *Werauhia* (in part)
13. Petals unappendaged; stigma never cupulate ..... 8. *Tillandsia* (in part)

1. AECHMEA

Aechmea Ruiz & Pav., Fl. Peruv. Prodr. 47. 1794, *nom. conserv.*

Epiphytic, lithophytic or terrestrial, usually acaulescent herbs. Leaves numerous, in dense rosettes; bases sheathing, enlarged; blades linear-attenuate, acute or mostly obtuse to rounded, acuminate to apiculate; margins usually spinose-serrate. Inflorescence scapose, simple or compound. Flowers bisexual, distichous or polystichous, sessile or stipitate. Sepals free or connate, usually strongly asymmetric and mucronate; petals symmetrical, free, bearing 2 basal appendages; stamens shorter than petals, free or the second series adnate to the petals, unappendaged; anthers dorsifixed; ovary inferior. Fruit baccate; seeds numerous, small, naked, dark colored. A genus of about 170 species from the Neotropics.

TYPE: *Aechmea paniculata* Ruiz & Pav..

Key to the species of *Aechmea*

1. Inflorescence open, evidently compound, the branches distichous, more than 9 cm long ..... 2. *A. lingulata*
1. Inflorescence dense, simple or with polystichous branches, 2-5 cm long. 2
2. Inflorescence ovoid-pyramidal, flower bracts exceeding the flowers ..... 1. *A. fasciata*
2. Inflorescence cylindrical, flower bracts shorter than the flowers or wanting ..... 3. *A. nudicaulis*

1. Aechmea fasciata (Lindl.) Baker, J. Bot. 17: 231. 1879; *Billbergia fasciata* Lindl., Bot. Reg. 13: pl. 1130. 1828. Type: Brazil; Rio de Janeiro. Lindl., *Bot. Reg. 13: pl. 1130.* 1828.

Epiphytic, acaulescent, rhizomatous herbs. Leaves numerous in a rosette, pale-appressed-lepidote on both sides, coriaceous, 30-110 × 3-8 cm; sheaths large, slightly wider than the blade, ovate-elliptic, unarmed; blades linear, attenuate, the margins armed with dark spines to 2 mm long; apex acute to rounded, apiculate. Scape erect, 50-60 cm long, white flocculose; sterile bracteoles lanceolate, sheathing at base, acuminate, pungent, serrate, 7-9 cm long, the lower loosely arranged and erect, the upper congested and subspreading.

Inflorescence simple or with few basal branches, densely pyramidal-ovoid, 7-10 cm long; primary fertile bracteoles like the sterile ones but smaller, exceeding the branches; spicate branches erect, ovoid, densely-flowered, 2-5 cm long; bracts rose lanceolate or ovate, long acuminate, exceeding the sepals, strongly serrulate. Flowers polystichous, sessile; sepals asymmetric, mucronulate, or acute, 1-1.2 cm long; petals ligulate, 2.5-3 cm long, blue, purple or red when dry; stamens included, filaments of the second series adnate to the petals; ovary ellipsoid.

General distribution: Native to Brazil, one of the most popular bromeliads for horticulture.

Distribution in Puerto Rico: Commonly cultivated as an ornamental, known to have naturalized in a *Pterocarpus* forest in Humacao.

Selected specimens examined: PUERTO RICO: Humacao: *Proctor 48637* (SJ).

2. Aechmea lingulata (L.) Baker, J. Bot. 17: 164. 1879; *Bromelia lingulata* L., Sp. Pl. 285. 1753; *Chevalliera lingulata* (L.) Griseb., Fl. Brit. W. I. 591. 1864; *Wittmackia lingulata* (L.) Mez in Martius, Fl. Bras. 3(3): 275. 1891. Lectotype: Plate 170 of the Boerhaave set of Plumier illustrations at the library of Rijksuniversiteit, Groningen, here designated.
Aechmea plumieri Baker, Handb. Bromel. 50. 1889. Type: America. Plumier (Burman ed.), *Pl. Amer. 1: t. 64, f. 1. 1756.*

Fig. 40. A-F

Epiphytic, terrestrial or lithophytic herb; stems to 12 cm long, erect or decumbent. Leaves rosulate, rigid, coriaceous, to ca. 1 m × 2-10 cm, lepidote throughout; sheaths broader than blade, ovate-oblong, unarmed; blade linear, attenuate; margins serrate with dark, upwardly curved spines, 1-2 mm long; apex acute to rounded, apiculate. Scape slender, erect, to 1 m long, floccose when young; sterile bracteoles erect, lanceolate or oblong, sharply acuminate, 4-8 cm long. Inflorescence very large and open, distichously branched; primary fertile bracteoles like the sterile ones but mostly shorter; branches several, ascending, 9-16 cm long, polystichously-flowered. Flowers sessile; bracts deltate-subulate, 4-10 mm long; sepals 5-6 mm long, asymmetrical, subapically cuspidate; petals acute, 7-10 mm long; stamens included, those of second series adnate to petals; ovary ovoid, ellipsoid, cylindrical or clavate. Berries ovoid, 8-10 mm long, purple-red.

General distribution: Costa Rica, Puerto Rico, Virgin Islands, the Lesser Antilles, Bahamas, Trinidad, Tobago, Venezuela, Guyana, Surinam, French Guiana, and northern Brazil.

Distribution in Puerto Rico and the Virgin Islands: Woods, thickets and edges of forest at low elevations (0-400 m), from xeric to moist conditions, usually in rocky situations. A rare species not collected in Puerto Rico since 1914. Liogier (1982) reported it from Punta Picúa at Río Grande but no voucher was located, it is otherwise known from Vieques and Culebra; St. John, St. Thomas, and Virgin Gorda.

Selected specimens examined: PUERTO RICO: Culebra: N.L. *Britton & Wheeler 96* (US). San Juan: Río Piedras, *Stevenson 1805* (US). Vieques: vicinity of Isabel Segunda, *Shafer 2488* (US). ST. JOHN: *Vélez 3102a* (US); Maho Bay Quarter; Center Line Road, *Acevedo-Rdgz. et al. 4035* (NY, US). ST. THOMAS: *E.G. Britton & Marble 1428* (US); *Eggers 1200* (US).

3. Aechmea nudicaulis (L.) Griseb., Fl. Brit. W. I. 593. 1864; *Bromelia nudicaulis* L., Sp. Pl. 286. 1753. Lectotype: Plate 171 of the Boerhaave set of Plumier illustrations at the library of Rijksuniversiteit, Groningen, here designated.

Epiphytic, lithophytic or terrestrial, herb; stems short. Leaves numerous, rigid, coriaceous, 30-80 × 2-9 cm, punctate-lepidote throughout or glabrescent above, forming a dense fasciculate, funnelform rosette, the outer sometimes reduced and scale-like; sheaths large, elliptic, slightly wider than the blades, unarmed; blades linear, attenuate, the margins serrate with dark spines, 2-4 mm long; apex obtuse to rounded, apiculate. Scape slender, erect or nodding, shorter than the leaves, white floccose; sterile bracteoles erect, imbricate, the upper congested below the inflorescence, 5-10 cm long, elliptic, oblong or lanceolate, narrowly acute to long-acuminate, chartaceous, weakly and minutely armed or entire, red. Inflorescence a simple spike, cylindrical, fertile throughout, 5-12 cm long; bracts entire, subulate, much shorter than the flowers, shortening towards the apex of the inflorescence, sometimes wanting. Flowers sessile; sepals

asymmetric, mucronate, 5-10 mm long; petals acute, ca. 1.2 cm long, greenish; ovary densely pale-lepidote. Berry ovoid to globose, orange to brownish red.

General distribution: Mexico, Nicaragua, Costa Rica, Panama, Cuba, Hispaniola, Puerto Rico, Venezuela, Trinidad & Tobago, Guyana, Ecuador, and Peru.

Distribution in Puerto Rico: Rare, mostly rocky situations on edges of forest, from sea level to 730 m. Recorded from Aibonito, Arecibo, Barranquitas, Río Grande, and Salinas.

Note: There has been disagreement with respect to the typification of Linnean names that were based on Plumier elements (Polhill & Stearn in Taxon 25:323-325. 1976.). An example of this disagreement involves both *A. lingulata*, and *A. nudicaulis*. Smith & Downs (1979) typified these species with Plumier specimens, collected from the West Indies during the Surian expedition in 1689-1690. These typifications are erroneous, since it is well known that Linnaeus never saw the Surian material. Howard (1979), on the other hand, typified *A. lingulata* with a Plumier plate (Pl. Amer., t. *64, fig. 1*. 1756.). This has erroneously been accepted as the correct typification even though this figure was published later than Linnaeus' 1753 Species Plantarum. However, there is convincing evidence that Linnaeus studied the artist Claude Aubriet's tracings of Plumier's plates made for Herman Boerhaave at Leyden, and used information from these plates to prepare diagnoses for the species he described (C. Jarvis & D. Nicolson, pers. comm.; Polhill & Stearn in Taxon 25: 323-325. 1976). Type material of these two taxa are among the Boerhaave set of Plumier illustrations (Codex Boerhaavianus) deposited at the library of Rijksuniversiteit, Groningen, the Netherlands.

Selected specimens examined: PUERTO RICO: Aibonito: *Liogier 37425* (UPR). Arecibo: Garrochales, *Stevenson 2399* (UPR, US). Río Grande: *Proctor 42674* (SJ). Salinas: *Proctor 42400* (SJ); Bo. Lapa, *Proctor 42501* (SJ).

Excluded Species

Aechmea paniculata Ruiz & Pav., Syst. Veg. Fl. Peruv. Chil. 83. 1798. Britton & P. Wilson (1923) note that this taxon was reported for St. Thomas by Krebs based on an error in determination.

2. ANANAS

Ananas Mill., Gard. Dict. Abr. ed. 4. 1754.

Terrestrial herbs. Leaves numerous, densely rosulate, linear-attenuate, coriaceous, stiff, the margins armed with hooked spines, the sheaths slightly enlarged. Inflorescence scapose, densely spicate, usually crowned with several, fascicled, imbricate, sterile, foliaceous bracts. Flowers bisexual, sessile; sepals free, erect; petals free, ligulate; stamens included; ovary inferior, style filiform. Fruit compound (formed by the fusion of the gynoecia, bracts, and axis), fleshy. A genus of seven species native to tropical South America.

NEOTYPE: *Bromelia ananas* L. (≡ *Bromelia comosa* L.) (= *Ananas comosus* (L.) Merr.), designated by L. B. Smith, N. Amer. Fl. 19: 214. 1938.

1. Ananas comosus (L.) Merr., Interpr. Herb. Amboin. 133. 1917; *Bromelia comosa* L., Herb. Amboin. 21. 1754. Type. Rumphius, *Herb. Amboin. 5: t. 81.* 1747, designated by Merrill, Interpr. Herb. Amboin. 33, 133. 1917.

Bromelia ananas L., Sp. Pl. 285. 1753; *Ananas sativus* Schult. & Schult. f., Syst. Veg. 7: 1283. 1830, as a new name; *Ananas ananas* (L.) H. Karst. ex Voss, Vilm. Blumengärtn., ed.3, 1: 964. 1895., *nom. inadmiss*. Type: To be sought among several syntypes.

Ananassa monstrosa Carr., Rev. Hort. 42: 288. 1870; *Ananas monstrosus* (Carr.) L. B. Sm., Phytologia 8: 12. 1961. Type: *Carrière s.n.* (probably at P).

Terrestrial, acaulescent plant, highly variable with many cultivated varieties. Leaves to 1 m × 2-4 cm, linear-lanceolate to deltate-attenuate, lepidote on both surfaces, the margins upwardly spinose-serrate, cuspidate. Scape short and stout, to ca. 18 cm long, shorter than the leaves;

inflorescence simple, conical-ovoid, subtended and crowned with spiny, green, leafy bracts; flowers numerous, erect, sessile; corolla violet or red. Fruits compound, fleshy, varying considerably in size, 10-25 cm long, golden yellow, crowned with spiny green bracts; seeds typically wanting.

General distribution: Native of Brazil, widely cultivated in the tropics.

Distribution in Puerto Rico: A major crop in Puerto Rico, cultivated for its fruit; persistent after cultivation and naturalizing, especially on the northern coastal plain. Reported as naturalized in Vega Baja (surroundings of Laguna Tortuguero).

Common names: Puerto Rico: *Piña*; *Pineapple*.

Selected specimens examined: PUERTO RICO: Bayamón: *Sintenis 1033* (US); *Stevenson 3925* (US). Vega Baja: Bo. Algarrobo, white sand area just S of Laguna Tortuguero, *Proctor et al. 47737* (US).

3. BROMELIA

Bromelia L., Sp. Pl. 285. 1753.

Large, terrestrial herbs, spreading by rhizomes or stolons. Leaves in rosettes, cuspidate, the margins with large curved spines. Inflorescence sessile or scapose, mostly paniculate. Flowers bisexual; sepals free to connate, obtuse or acute; petals connate at base; stamens included; ovary inferior. Fruit baccate, succulent, indehiscent; seeds few to many, flattened, unappendaged. A genus of about 50 species from tropical America, extending from Mexico to Argentina, and the West Indies.

LECTOTYPE: *Bromelia karatas* L., designated by Regel, Gartenflora 17: 67. 1868.

1. Bromelia pinguin L., Sp. Pl. 285. 1753.
Lectotype: Dillenius, *Hort. Eltham. 320, t. 240, f. 311. 1732*, designated by R.A. Howard, Fl. Lesser Antill. 3: 409. 1979.

Figs. 40. G-J; 65. A

Large terrestrial herb, usually in colonies. Leaves numerous, in a rosette, much exceeding the inflorescence; sheaths broad, dark brown, densely lepidote; blades linear, long-attenuate at apex, rigid, ca. 2 m × 4 cm; margins armed with stout, hooked spines to 10 mm long; apex pungent. Scape stout, 8-15 cm long, white floccose; sterile bracteoles subfoliaceous, the sheaths subinflated, the upper shorter. Inflorescence erect, to ca. 30 cm long, white floccose, paniculate, pyramidal, many-flowered; fertile bracteoles like the scape bracteoles, the upper ones entire; bracts subulate, to 2.5 cm long. Flowers pedicellate, white-floccose, 3-6 cm long; sepals erect, narrowly deltate-subulate; petals pink, whitish towards margins and base, to 3 cm long, linear-elliptic, white-tomentose at apex; stamens ca. 2 cm long. Capsules ovoid, 3-4 cm long, yellow, verrucose, white-floccose, beaked. Seeds covered with a creamy acid pulp.

General distribution: Mexico, Central America, Greater Antilles, Virgin Islands, Lesser Antilles, Colombia, Venezuela, Surinam, and Ecuador.

Distribution in Puerto Rico and the Virgin Islands: Thickets and hedges, disturbed areas, and waste grounds. Of ample occurrence, probably in the majority of the municipalities, recorded from Aibonito, Arecibo, Cabo Rojo, Cayey, Comerío, Corozal, Fajardo, Guánica, Loíza, Maricao, Río Grande, Río Piedras, Salinas, San Juan, and Vieques; St. Croix, St. John, and St. Thomas.

Common name: Puerto Rico: *Maya*.

Note: Smith & Downs (1979) cited a specimen in the Clifford Herbarium at BM as the type of *Bromelia pinguin*. However, we have not been able to locate such a collection at BM, therefore we are following Howard's lectotypification made a few months earlier than Smith & Downs publication.

Selected specimens examined: PUERTO RICO: Fajardo: *Sintenis 950* (US). San Juan: Río Piedras, *Stevenson 517* (US). Vieques: Isabel Segunda to Campo Cielo, *Shafer 2337* (US). ST. CROIX: *Ricksecker 342* (US). Christiansted, *Rose et al. 3546* (US). East End, *Ricksecker 284* (US). Ridge SW of Lang Peak (Jakobsberg), above Eliza's Retreat, *Fosberg & Ogden 55267* (US). ST. JOHN: Lind Point area, *Acevedo-Rdgz. 2798* (NY, US, MO, US, UPR, VINPS). ST. THOMAS: *Morrow 93* (US).

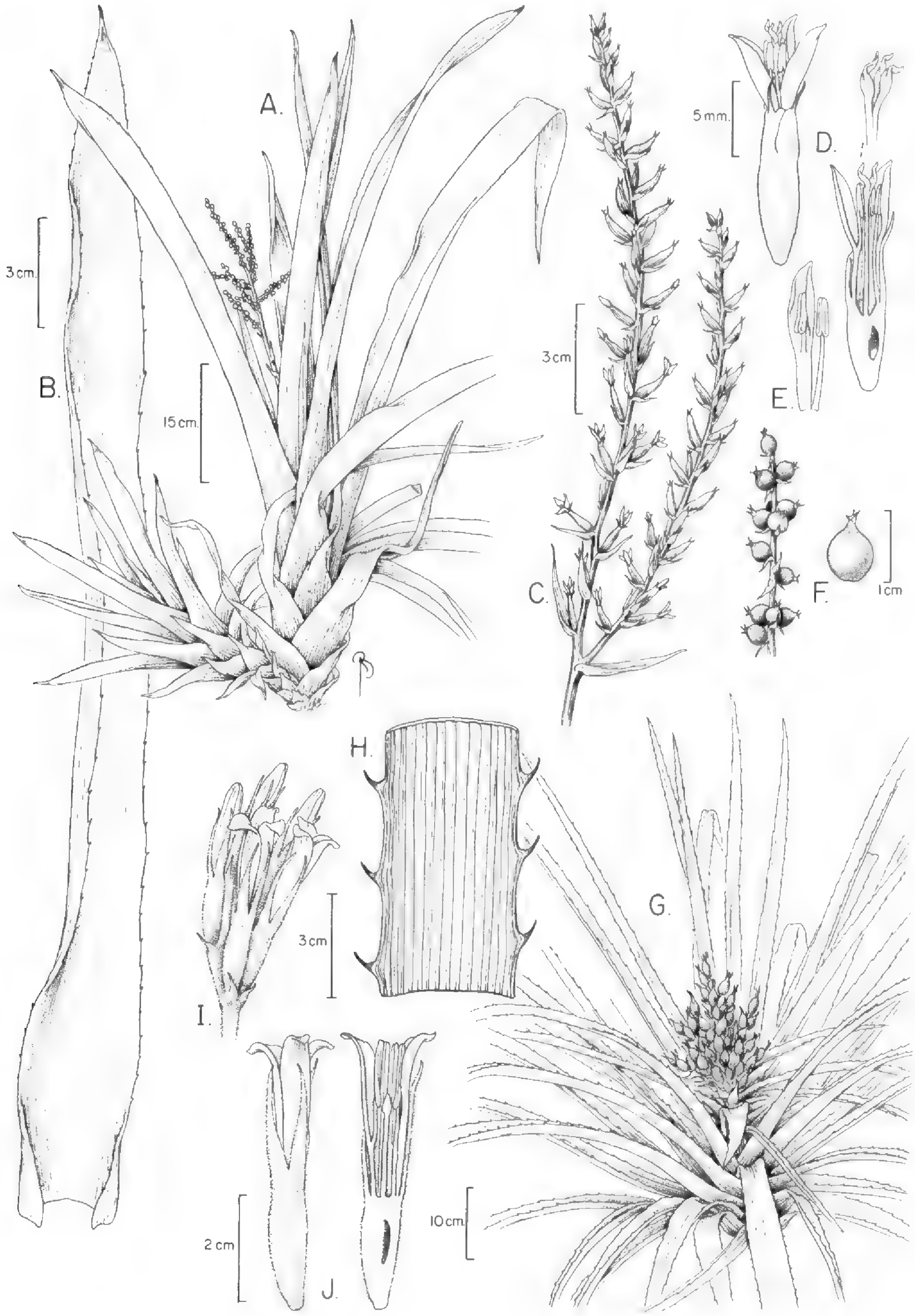


Fig. 40. A-F. *Aechmea lingulata.* **A.** Habit. **B.** Leaf. **C.** Inflorescence branch. **D.** Flower, l.s. flower, and detail of stigma. **E.** Stamen adnate to petal, and free stamen. **F.** Portion of infructescence, and berry. **G-J.** *Bromelia pinguin.* **G.** Habit. **H.** Section of leaf blade. **I.** Inflorescence branch. **J.** Flower, and l.s. flower. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

Excluded Species

Bromelia plumieri (E. Morren) L. B. Sm., Phytologia 15: 173. 1967, nom. Illeg. (≡ *Bromelia karatas* L.). Reported from Puerto Rico by Bello (Anales Soc. Esp. Hist. Nat. 12: 121. 1883); this is the only record of the species for the island, and may have been based on a specimen in cultivation (Britton & P. Wilson, 1923).

4. CATOPSIS

Catopsis Griseb., Nachr. Königl. Ges. Wiss. Georg-Augusts-Univ. 1864: 10, 12. 1864.

Epiphytic acaulescent herbs. Leaves in a rosette, minutely appressed-lepidote, entire, green. Inflorescences scapose, spicate or paniculate, exceeding the leaves, the branches polystichous-flowered. Flowers small, sessile or subsessile, bisexual or functionally unisexual; sepals free, rounded, strongly asymmetric; petals free, naked, white or yellow; stamens included; ovary superior, ovoid or ellipsoid; style short or missing; capsule septicidally dehiscent above the middle; seeds thick, the coma apical and folded over. A genus of about 20 species from tropical and subtropical America and the West Indies.

LECTOTYPE: *Catopsis nitida* (Hook.) Griseb. (≡ *Tillandsia nitida* Hook.), designated by J. R. Grant & Zijlstra, Selbyana 19: 97. 1998.

Key to the species of *Catopsis*

1. Sheaths distinctly dilated, blades deltate-attenuate, the apex acuminate ..... 1. *C. floribunda*
1. Sheaths slightly dilated to indistinctly so, blades linear, the apex obtuse to rounded and apiculate ... 2
   2. Leaves 10-40 cm long, closely imbricate in a cylindrical rosette; inflorescence always branched; sepals 3-5 mm long, strongly asymmetric with one side cuneate at base and the apex much expanded into a large wing; capsules 6-11 mm long ..... 2. *C. nitida*
   2. Leaves 10-25 cm long, more or less loosely imbricate in a cylindrical-funnelform rosette; inflorescence simple or few branched; sepals 6-8 mm long, weakly asymmetric; capsules 12-15 mm long ..... 3. *C. sessiliflora*

1. Catopsis floribunda L. B. Sm., Contr. Gray Herb. 117: 5. 1937. Holotype: Martinique. *Pleé s. n.* (P, not seen).

Catopsis nitida sensu Duss, Fl. Phan. Antill. Fr. 577. 1897, in part, non (Hook.) Griseb., 1864.

Catopsis nutans sensu Britton & P. Wilson, Bot. Porto Rico 5: 137, 1923 and Liogier, Phytologia 47(3): 197. 1980, non Grisebach, 1864.

Fig. 43. D-F

Epiphytic, acaulescent herb, commonly forming clusters. Leaves numerous, densely rosulate, sub-erect , entire, punctulate-lepidote on both surfaces, 10-40 cm long; sheaths ovate-elliptic, to 8 cm wide; blades deltate-attenuate, long-acuminate, 1.5-3 cm wide at the base. Scape erect, 2-4 mm in diam., glabrous, much longer than the leaves; sterile bracteoles erect, lanceolate, the lower ones foliaceous, the upper ones longer than the internodes. Inflorescence paniculate, many-flowered, to 40 cm long; fertile bracteoles subspreading, ovate-lanceolate, long acuminate, 1.5-3 cm long; the branches ascending, 1-2 mm wide; bracts subspreading, ovate, acute to acuminate, 3-5 mm long. Flowers sessile or subsessile, sub-erect ; sepals elliptic, asymmetric, 4-6 mm long; petals white, elliptic, ca. 7 mm long, obtuse. Capsule ovoid, acute, 9-11 mm long.

General distribution: Southern Florida, Central America, Greater Antilles, Virgin Islands, Lesser Antilles, Trinidad & Tobago, and Venezuela.

Distribution in Puerto Rico and the Virgin Islands: In moist forest, from near sea level to 900 m. Recorded from Aibonito, Barranquitas, Bayamón, Caguas, Camuy, Cayey, Ciales, Guayama, Jayuya, Maricao, Naguabo, Orocovis, Río Grande, Salinas, Villalba, and Yauco; St. Croix, St. John, St. Thomas, and Virgin Gorda.

Selected specimens examined: PUERTO RICO:

Bayamón: *Stevenson 1144* (US). Cayey: *Sintenis 2043* (US). Ciales: E slopes of Los Tres Picachos, *Axelrod & Axelrod 4830* (US). Guayama: Bo. Carmen, along crest (S. side) of Sierra de Jajome 2-2.8 km. due NE-ENE of village of Carmen, *Proctor & Rivera 46921* (US); 3 mi S of Guayama on Rt. 15, *Grant & Rundell 93-02267* (US). Jayuya: *Sargent 3072* (US). Maricao: Monte Alegrillo, *N.L. Britton et al. 2560* (US). Naguabo: Sierra de Luquillo, Loma La Mina, SE side to E Peak, *Shafer 3257* (US). Orocovis: Toro Negro Forest Reserve, Lago Guineo, *Ackerman & Meléndez 2662* (US). Río Grande; Caribbean National Forest, El Yunque, *Acevedo-Rdgz. 2963* (NY, US). Villalba: Along road 143 (north of Villalba) at km 45 hm 8, *Stimson 1668* (US). St. John: Bordeaux, *N.L. Britton & Shafer 572* (NY). St. Thomas: *Eggers s.n.* (US). Virgin Gorda: Gorda Peak National Park, *Acevedo-Rdgz. & Clubbe 10899* (US).

2. Catopsis nitida (Hook.) Griseb., Fl. Brit. W. I. 599. 1864; *Tillandsia nitida* Hook., Exotic Fl. 3. 1826. Type: Jamaica. *Wiles s. n.* (holotype: LIV, not seen).

Epiphytic, acaulescent herb, producing stolons and commonly forming clumps. Leaves few, closely imbricate in a cylindrical rosette, sub-erect, entire, 10-40 × 2-4 cm, the outer usually smaller; sheaths indistinct; blades linear-attenuate; apex obtuse to rounded, apiculate. Scape erect to ascending, slender, glabrous; sterile bracteoles erect, sheathing, ovate-deltate, acute, 5-10 mm long. Inflorescences laxly branched, to 20 cm long, exceeding or equaling the leaves, glabrous; fertile bracteoles like the sterile bracteoles but usually smaller; branches naked below, many-flowered above, ascending to subspreading, ca. 1 mm in diam.; bracts ovate, acute, shorter than the sepals. Flowers sessile, bisexual; sepals strongly asymmetric, ca. 5 mm long; petals white or cream, elliptic, obtuse, 6-8 mm long; style wanting. Capsule ovoid, acute, 6-11 mm long.

General distribution: Southern Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Cuba, Jamaica, Hispaniola, and Puerto Rico.

Distribution in Puerto Rico: Moist to wet montane forest above 500 m elev. Recorded from Adjuntas, Barranquitas, Ciales, Jayuya, Maricao, Naguabo, Orocovis, Río Grande, Utuado, and Villalba.

Selected specimens examined: Puerto Rico: Adjuntas: vicinity of Pico Guilarte, *Liogier 10009* (US). Barranquitas: Bo. Barrancas, upper NE slopes of Monte Torrecilla, *Proctor & Concepción 42308* (US). Jayuya: Los Tres Picachos, *Sargent 3172* (US). Maricao: *Sargent 225* (US). Naguabo: Bo. Río Blanco, Caribbean National Forest, *Axelrod & Chavez 4130* (US). Utuado: 7 mi N from Adjuntas along road to Arecibo, *Grant & Rundell 93-02296* (US). Villalba: along border w/ Orocovis, W slopes of Cerro Doña Juana, between Cerro Doña Juana and Cerro el Bolo, *Ackerman & Calvo 2467* (US).

3. Catopsis sessiliflora (Ruiz & Pav.) Mez in C. de Candolle, Monogr. Phan. 9: 625. 1896; *Tillandsia sessiliflora* Ruiz & Pav., Fl. Peruv. 3: 42. 1802. Type: Peru; Huánuco. *Ruiz & Pavón s. n.* (holotype: MA?, isotype: B, photo at GH).

Epiphytic, acaulescent herb, usually in clumps. Leaves few in a cylindrical-funnelform rosette, 10-25 × 1.5-3.5 cm, linear-attenuate, entire, sub-erect ; sheaths indistinct; blades linear-attenuate; apex acute to mostly rounded or obtuse and apiculate. Scape sub-erect , glabrous, 1-2 mm in diam., 15-30 cm long; sterile bracteoles erect, elliptic-ovate, apiculate, 8-13 mm long. Inflorescence a simple spike or with few ascending branches, exceeding the leaves; fertile bracteoles like the sterile ones; spikes laxly- to densely-flowered, subspreading, the axis 1-2 mm wide; bracts ovate, acute or obtuse, shorter than the sepals. Flowers sessile, sub-erect ; sepals asymmetric, 6-8 mm long; petals white, ovate-lanceolate, about as long as the sepals. Capsule ovoid, short beaked, 12-15 mm long.

General distribution: Southern Mexico, Guatemala, Honduras, Costa Rica, Panama, Cuba, Hispaniola, Puerto Rico, Guadeloupe, Martinique, Grenada, Colombia, Venezuela, Trinidad & Tobago, Guyana, Surinam, French Guiana, Ecuador, Peru, and Brazil.

Distribution in Puerto Rico: Rare, known only from four specimens. Moist and wet forest, from sea level to ca. 600 m. Recorded from Maunabo, Naguabo, and San Lorenzo.

Selected specimens examined: Puerto Rico:

Maunabo: Maunabo Beach Area, *Woodbury s. n.* (UPR). Naguabo: Sierra de Naguabo, Bo. de Maizales, *N.L. Britton & Cowell 2188* (US); Caribbean National Forest, Río Sabana *Hansen et al. 9409* (UPR). San Lorenzo: Hato Grande, Monte Gregorio, *Sintenis 2466* (US).

5. GUZMANIA

Guzmania Ruiz & Pav., Fl. Peruv. 3: 37. 1802.

Terrestrial, lithophytic or mostly epiphytic and usually acaulescent herbs. Leaves polystichous-rosulate, entire, linear-attenuate, green. Inflorescences scapose, simple (or compound outside Flora area), shorter than or exceeding the leaves. Flowers bisexual; sepals oblong, symmetrical; petals lacking basal appendages, connate proximally and forming a tube; stamens equal, inserted on the corolla throat; ovary superior; style elongated. Capsule septicidally dehiscent; seeds basally comose. A genus of about 167 species from tropical and subtropical America and the West Indies. Named in honor of Anastasio Guzmán, a Spanish naturalist.

TYPE: *Guzmania tricolor* Ruiz & Pav.

Key to the species of *Guzmania*

1. Inflorescence spicate, elliptic-cylindrical 2
1. Inflorescence densely corymbiform, torch-like or capitate ..... 2. *G. lingulata var. concolor*
   2. Leaves 30-70 cm long; leaf blades just above the sheath 2-5 cm wide; bracts 4-7 cm long; sepals 2-2.5 cm long; corolla yellow, 5-7 cm long ..... 1. *G. berteroniana*
   2. Leaves 20-50 cm long; leaf blades just above the sheath 1.5-3 cm wide; bracts 2-3.5 cm long; sepals 1.5-2.0 cm long; corolla white, 2-3 cm long ..... 3. *G. monostachia*

1. Guzmania berteroniana (Schult. & Schult.f.) Mez in C. de Candolle, Monogr. Phan. 9: 904. 1896 (as "berteroana"); *Caraguata berteroniana* Schult. & Schult.f., Syst. Veg. 7(2): 1229. 1830; *Tillandsia caraguata* D. Dietr., Syn. Pl. 2: 1059. 1840; *nom. illeg.* Type. Puerto Rico. *Bertero s. n.* (holotype: B).
Caraguata grandiflora Baker, Handb. Bromel. 145. 1889. Type: Puerto Rico; Maricao. *Sintenis 471* (holotype: K; isotypes GH, US!).
Guzmania erythrolepis sensu Britton & P. Wilson, Bot. Porto Rico 5: 143. 1923, non Brongniart ex Planchon.

Fig. 65. C

Terrestrial or epiphytic, usually large, acaulescent herb; usually forming large colonies when terrestrial. Leaves numerous, fasciculate in a dense rosette, 30-70 cm long, ascending to arching, entire, obscurely punctulate-lepidote toward the base; sheaths inconspicuous to much broader than the blades, ovate-elliptic, brown; blades linear-attenuate, 2.5-5 cm wide, acute or acuminate. Scape erect, glabrous, shorter than the leaves; sterile bracteoles erect, densely imbricate, the lower ones subfoliaceous, the upper ones shorter, red, their sheaths becoming larger and broader and their blades reduced toward the apex of the scape. Inflorescence a simple, cylindrical-elliptic spike, 15-30 cm long, the apex usually sterile or with aborted flowers; bracts dark red, erect, densely imbricate, chartaceous, nerved, broadly elliptic, 4-7 × 1.5-3 cm, smaller toward the apex of the inflorescence, the lower ones abruptly acuminate-apiculate and the upper ones acute-apiculate. Flowers bisexual, subsessile, solitary; sepals elliptic, acute to obtuse, sometimes bifid, connate at base, 1.5-2.5 cm long; corolla yellow, 5-7 cm long, the lobes elliptic-oblong, acute to obtuse; stamens and stigma inserted. Smith & Downs (1979) describe its capsules as subprismatic, acute, and 3 cm long, and its seeds as having a white coma.

General distribution: Panama, Dominican Republic, and Puerto Rico.

Distribution in Puerto Rico: Moist and wet mountain forests, above 200 m. Recorded from Aibonito, Arecibo, Barranquitas, Canóvanas,

Cayey, Ciales, Guayama, Jayuya, Luquillo, Maricao, Naguabo, Ponce, Patillas, Río Grande, Salinas, Sabana Grande, San Germán, Utuado, Yabucoa, and Yauco.

Common names: Puerto Rico: *Parásita, Pirigallo.*

Selected specimens examined: PUERTO RICO: Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10641* (US). Barranquitas: La Torrecilla, trail from summit ridge down to forest road, *Axelrod 6993* (US). Guayama: Mt. between Guayama and Cayey, *N.L. Britton et al. 6573* (US). Maricao: *Sargent 670* (US); *N.L. Britton et al. 2587* (US). Río Grande: Caribbean Natl. Forest, along trail to Mt. Britton, *Thompson & Thompson 3182* (US).

2. Guzmania lingulata var. concolor Proctor & Cedeño-Mald., var. nov. Type: Puerto Rico; Sierra de Luquillo, Loma La Mina, *J. A. Shafer 3279* (holotype: US).

Fig. 41. A-C

Folia numerosa in rosula densa, 25-50 cm larga, interiora breviora, integra, viridia concolora; vaginae plerumque distinctae, ovatae, punctulato-lepidotae; laminae lineari-attenuatae, ca. 4 cm latae, acutae vel acuminatae. Bracteae florales virides vel rubrae, erectae, lanceolatae vel lineari-attenuatae, acuminato-acutae, cucullatae, sepalis multo longiores.

Terrestrial or epiphytic, acaulescent herb, usually forming colonies at the base of tree trunks. Leaves numerous, in a dense rosette, 25-50 cm long, the inner ones shorter, entire, green, concolorous; sheaths mostly distinct, ovate, punctulate-lepidote; blades linear-attenuate, ca. 4 cm wide, acute to acuminate. Scape erect, stout, shorter than the leaves, 12-25 cm long; sterile bracteoles erect, densely imbricate, the lower ones foliaceous, the uppermost lanceolate, green, red or reddish, forming a cup-shaped involucre below the inflorescence. Inflorescence apical, simple, densely-flowered, corymbiform, with a mucilaginous substance within; bracts green or red, erect, lanceolate to linear-attenuate, acuminate-acute, cucullate, much longer than the sepals. Flowers bisexual, pedicellate, erect; sepals free, linear, obtuse-rounded, 1.5-2 cm long; corolla white, the lobes linear, obtuse-rounded, cucullate; stamens adnate to the petals. Capsule oblong-ellipsoid, short beaked, 2.8-3.5 cm long; seeds with reddish brown coma.

General distribution: Belize, Cuba, Hispaniola, Puerto Rico, the Lesser Antilles, Trinidad & Tobago, northern South America south to Bolivia.

Distribution in Puerto Rico and the Virgin Islands: Moist and wet forest, ca. 200 m and above. Recorded from Adjuntas, Arecibo, Bayamón, Caguas, Camuy, Naguabo, San Germán, San Lorenzo, San Sebastián, and Yabucoa.

Note: Several varieties have been attributed to *Guzmania lingulata* (L.) Mez , mostly based on the size and color patterns of the leaves and the color of the bracts of the inflorescences (see L. B. Smith, Fl. Neotrop. Monogr. 14(2): 1349. 1977.). The variety with wide and concolorous leaves, which occurs in Puerto Rico, has been erroneously attributed to *G. lingulata* var. *lingulata*. This variety does not occur in Jamaica, where Sloan collected the type specimen for *G. lingulata*. On the other hand, only one of the varieties has been recognized to occur in Jamaica. Instead of being considered the typical variety, the Jamaican taxon was erroneously attributed to *G. lingulata* var. *splendens* (Planch.) Mez. Thus, to correct the situation, var. *splendens*, with purplish striped leaves, must be considered a synonym of var. *lingulata*. In addition, a new name is hereby provided for the taxon previously referred to as var. *lingulata*.

Guzmania lingulata var. *concolor* differs from *G. lingulata* var. *lingulata* (of which *G. lingulata* var. *splendens* is a synonym) in that the former has concolorous leaves and the latter has leaves with red-purple longitudinal stripes.

Selected specimens examined: PUERTO RICO: Arecibo; Río Abajo State Forest, *Acevedo-Rdgz. 10656* (US). Naguabo: Sierra de Luquillo, Loma La Mina, SE side to E peak, *Shafer 3279* (US). San Sebastián: Bo. Cibao, along E side of Río Guajataca in gorge S of Lago de Guajataca, *Proctor et al. 48108* (US).

3. Guzmania monostachia (L.) Rusby ex Mez in C. de Candolle, Monogr. Phan. 9: 905. 1896; *Renealmia monostachia* L., Sp. Pl. 287. 1753; *Tillandsia monostachia* (L.) L., Sp. Pl. ed 2, 410. 1762. Lectotype: West Indies. A plate of the Boerhaave set of Plumier illustrations at the library of Rijksuniversiteit, Groningen, here designated.

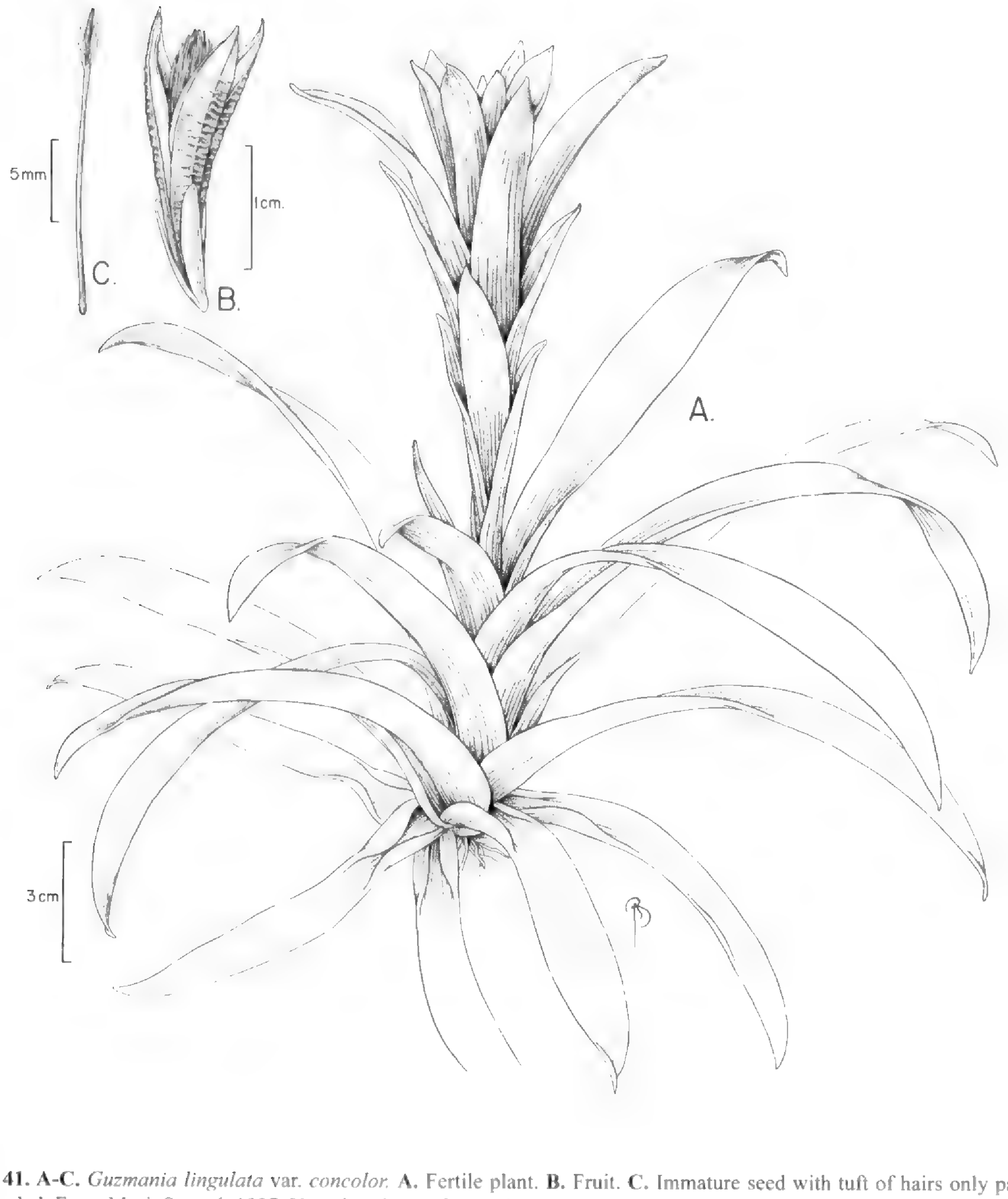


Fig. 41. A-C. *Guzmania lingulata* var. *concolor.* **A.** Fertile plant. **B.** Fruit. **C.** Immature seed with tuft of hairs only partially expanded. From Mori, S. et al. 1997. Vascular plants of central French Guiana. Mem. NYBG Vol. 76(1).

Guzmania tricolor Ruiz & Pav., Fl. Peruv. 3: 38. 1802. Type: Peru. *Ruiz & Pavón s. n.* (holotype: MA, not seen).

Fig. 65. B

Epiphytic, or sometimes terrestrial, acaulescent herb. Leaves numerous, in a dense rosette, entire, 20-50 cm long, the inner ones shorter, minutely punctulate-lepidote; sheaths conspicuous, broader than the blades, ovate-elliptic or ovate-oblong; blades linear-attenuate, 1.5-3 cm wide, acute to acuminate, green. Scape erect, stout, shorter than

the leaves, glabrous; sterile bracteoles erect, imbricate, the lowermost subfoliaceous, sheathing, densely imbricate, the upper ones broadly ovate, acuminate, pale green, slightly longer than the internodes. Inflorescence spicate, densely polystichous-flowered, cylindrical-elliptic, shorter than leaves, 12-23 cm long, sterile or with aborted flowers toward the apex; bracteoles erect, imbricate, chartaceous, ca. 2 × 2 cm, broadly ovate to quadrangular or obovate, the apex acuminate, acute or apiculate, the fertile ones pale green and usually with brownish purplish longitudinal stripes, the sterile ones pink, red or orange at the apex. Flowers bisexual, erect; sepals oblong to obovate, obtuse to rounded, connate at base, ca. 1.5 cm long, smooth; corolla white, 2-2.5 cm long, the lobes imbricate, elliptic, obtuse. Capsule elliptic-cylindrical, 2-4 cm long, pointed; seeds with whitish comose hairs, ca. 2 cm long.

General distribution: Southern Florida, Nicaragua to Peru, and Brazil, Bahamas, Greater Antilles, and Trinidad & Tobago.

Distribution in Puerto Rico: Moist and wet forests, ranging from near sea level to above 900 m. Recorded from Adjuntas, Arecibo, Bayamón, Cayey, Ciales, Guayama, Río Grande, Salinas, San Lorenzo, Utuado, and Yabucoa.

Selected specimens examined: PUERTO RICO: Adjuntas: Monte La Vega, *Sintenis 4403* (US). Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10739* (US). Bayamón: Hato Tejas, *Liogier 10371* (US). Cayey: Bo. Cercadillo, Cerro Avispa, *Proctor 42434* (US). Ciales: Bo. Toro Negro, ravine up N slope of Los Tres Picachos, *Axelrod & Stenzel 11137* (US). Río Grande: Caribbean National Forest, El Yunque, *Acevedo-Rdgz. 2962* (MO, NY, UPR, US). Utuado: 10 mi N from Adjuntas along road to Arecibo, *Grant & Rundell 93-02293* (US).

Excluded Species

Guzmania erythrolepis Brongn. ex Planch. was erroneously reported for Puerto Rico by Britton & P. Wilson, Bot. Porto Rico 5: 143, 1923, based *Britton et al. 2468* and *2587*. Study of these collections revealed them to be *Guzmania berteroniana* (Schult. & Schult. f.) Mez. instead. The report of *G. erythrolepis* from the Dominican Republic (Smith & Downs, 1977) is also erroneous, and similarly based on the misidentification of specimens of *G. berteroniana* (T. Zanoni, pers. comm.).

6. HOHENBERGIA

Hohenbergia Schult. f. in Roem. & Schult., Syst. Veg. 7(2): lxxi, 1251. 1830.

Medium to large, terrestrial, lithophytic or epiphytic, acaulescent herbs. Leaves in a rosette, polystichous; sheaths large, distinct, dark brown; blades linear, coriaceous, spinose-serrate, acuminate. Inflorescences scapose, compound (with one Brazilian exception), lanate or glabrous; secondary branches spicate, dense, ovoid-strobilate, bracteolate; bracts conspicuous, covering the ovary and often the sepals. Flowers bisexual, sessile; sepals asymmetric, distinct or connate at base, mucronulate; petals distinct or nearly so, unguiculate, the claw bearing two appendages; stamens included, the second series adnate to the petals; ovary inferior. Fruit baccate; seeds curved, unappendaged. A genus of about 48 species from the West Indies, northern South America to Brazil.

LECTOTYPE: *Hohenbergia stellata* Schult. f., designated by Britton & P. Wilson, Bot. Porto Rico 5: 134. 1923.

Key to the Species of *Hohenbergia*

1. Leaves 1 m long or longer, 6-13 cm wide; scape erect, stout, 4-20 mm thick; inflorescence densely branched; spicate branches 3-10 cm long; bracts 1.2-2.5 cm long, acute-punctate or gradually short-acuminate for ca. a third or less of their length ..... 1. *H. antillana*
1. Leaves usually less than 1 m long, 2-7 cm wide; scape erect, ascending or usually arching, 2-5 mm thick; inflorescence laxly branched; spicate branches 2-6 cm long; bracts 1-1.7 cm long, abruptly long-acuminate (almost caudate) for ca. half or more of their length ..... 2. *H. portoricensis*

1. Hohenbergia antillana Mez in C. de Candolle, Monogr. Phan. 9: 137. 1896. Lectotype: Puerto Rico; Cayey. *Sintenis 2000* (US). here designated.

Hohenbergia tetaensis Proctor & Cedeño-Mald., Harvard Pap. Bot. 4: 111. 1999. Type: Puerto Rico; Cayey. *Proctor 44657* (holotype: US; isotypes: IJ, SJ)

Large, epiphytic, terrestrial or lithophytic, acaulescent and rather variable herb, usually forming colonies. Leaves numerous, rosulate, coriaceous, stiff, arching, to ca. 1.5 m × 6-13 cm, minutely appressed-lepidote on both surfaces; sheaths slightly wider than the blades, elliptic-ovate, dark brown, the margins entire or spinulose near the apex; blades ligulate, the margins armed with dark spines 1-2.5 mm long, the apex broadly acute to rounded, short-acuminate, terminating in a stout, dark mucro. Scape erect, stout, 4-20 mm wide, densely creamy-white lanate-floccose; bracteoles erect, lanate-floccose, striate, sheathing, imbricate, concealing the scape, the margins weakly armed or entire, lanceolate, attenuate to acuminate, with a dark pungent tip. Inflorescence twice-branched, ovoid to ellipsoid or cylindrical, erect, exceeding or shorter than the leaves, creamy-white lanate or floccose throughout, 10-30 cm long, congested, especially toward the apex; lowest internodes to 2 cm long; primary bracteoles like those of the scape, the lower ones usually exceeding the branches, the upper ones usually shorter than the branches; spicate branches 15-20, strobilate, ovoid or ellipsoid to subcylindric, polystichously arranged, usually of simple spikes, or the lowermost ones with a small, secondary, sessile spike at the base; bracts broadly triangular-ovate, lanate, coriaceous, striate, equaling or exceeding the sepals, 1.2-2.5 cm long, acute or gradually short-acuminate for ca. a third or less of their length, pungent. Flowers sessile, polystichous; sepals strongly asymmetric, keeled, mucronate, 0.5-1.2 cm long; petals white, clavate, exceeding the sepals by 4-6 mm; ovary subglobose, enlarged in fruit. Fruits baccate, flattened-ovoid to pyriform, coriaceous, lanate, two-winged, ca. 1.5 cm long.

General distribution: Endemic to Puerto Rico and the Virgin Islands.

Distribution in Puerto Rico and the Virgin Islands: Thickets, woodlands and moist forests; more common in the northern karst region; from sea level to above 800 m. Recorded from Arecibo, Cabo Rojo, Cayey, Cidra, Dorado, Isabela, Quebradillas, Río Grande, Salinas, San Sebastián, Utuado, and Vega Baja; Guana Island, Scrub and Great Dog Islands.

Note: Hohenbergia tetaensis, a species published by Proctor & Cedeño-Maldonado (1999), is included here as a synonym of *H. antillana*. Additional fieldwork conducted by Cedeño-Maldonado between 1999 and 2004 at the type locality of *H. tetaensis*, revealed individuals attributable to *H. tetaensis* and *H. antillana* coexisting at the site, even within the same colony or clump. Individuals with intermediate morphologies were also found at the same and other localities in Puerto Rico.

Selected specimens examined: PUERTO RICO: Arecibo: 5 km S of Biáfara, *Acevedo-Rdgz. & Chinea 11646* (US); *Acevedo-Rdgz. & Siaca 11700* (US).

2. Hohenbergia portoricensis Mez in C. de Candolle, Monogr. Phan. 9: 136. 1896. Type: Puerto Rico; Sierra de Naguabo. *Sintenis 1321* (holotype: B, destroyed).

Hohenbergia attenuata Britton in Britton & P. Wilson, Bot. Porto Rico 5: 134. 1923. Type: Puerto Rico; Sierra de Naguabo. *Shafer 3567* (holotype: NY!).

Epiphytic, terrestrial and lithophytic, acaulescent and rather variable herb, usually forming clumps. Leaves numerous, rosulate, minutely appressed-lepidote on both surfaces, to ca. 1.5 m long but usually less than 1 m long, 2-6 cm wide; sheaths conspicuous or inconspicuous, mostly wider than the blade, elliptic-ovate, entire except at the apex; blades ligulate, the margins armed with dark, curved spinules 1-1.5 mm long, which become smaller closer to the apex; apex obtuse to acute or acuminate, apiculate, minutely spinulose or entire. Scape erect, ascending or usually arching, 2-5 mm thick, covered with lanate or floccose creamy-white indumentum at least when young; bracteoles erect, chartaceous, striate, lanate-glabrescent, spinulose, imbricate, lanceolate, attenuate to acuminate, pungent. Inflorescence thyrsoid, erect to arching, open, lowest internodes ca. 2.5 cm long, shorter toward apex, exceeding or shorter than the leaves, 15-30 cm long, sparsely or

densely whitish cream-lanate or floccose throughout, the axis 2-3 mm thick; bracteoles like the scape ones but spreading and entire, the lower ones exceeding the spikes, shortening toward the apex of the inflorescence; spicate branches subglobose, ovoid or subcylindric, strobilate, densely-flowered, 2-6 × 1.5-2 cm, those toward the apex of the inflorescence smaller and sessile; bracts 1-1.7 cm long, equaling or exceeding the sepals, subspreading, subcoriaceous, ovate, striate, abruptly long-acuminate for ca. half or more of its length, pungent. Sepals strongly asymmetric, ovate to deltoid-sagittate, keeled, mucronate, 5-10 mm long; petals linear-lanceolate, acute, ca. 11 mm long. Fruit pyriform, striate, glabrescent, slightly two-winged, ca. 1.2 cm long; seeds 2-2.5 mm long, purplish.

General distribution: Endemic to Puerto Rico.

Distribution in Puerto Rico: Slopes, ridges and peaks, usually in rocky outcrops, of moist and wet montane forests above 500 m. Recorded from Aibonito, Barranquitas, Cayey, Ciales, Guayama, Las Piedras, Luquillo, Maricao, Naguabo, Patillas, San Germán, San Lorenzo, and Yabucoa.

Selected specimens examined: PUERTO RICO: Ciales: Bo. Toro Negro, E slope of Los Tres Pichachos, *Axelrod & Axelrod 6700* (US). Naguabo: Sierra de Naguabo, Barrio de Maizales, *N.L. Britton & Shafer 2141* (US); Sierra de Naguabo, *Shafer 3336, 3567* (US). Patillas: Sierra de Cayey, Carite Forest Reserve, *Proctor & Zorilla 49375* (US).

7. PITCAIRNIA

Pitcairnia L'Hér., Sert. Angl. 7. 1789, *nom. conserv.*

Small to large, terrestrial, lithophytic or seldom epiphytic herbs with short to elongate stems. Leaves numerous, fasciculate or in a dense spiral along the stem, dimorphic; sheaths usually small, sometimes bulbose thickened; blades linear-lanceolate, spinulose-margined or entire. Inflorescence usually scapose, simple or compound; bracts conspicuous to minute. Flowers bisexual, showy, pedicellate to sessile; sepals free convolute; petals free, long and narrow, convergent over the stamens, naked or with a single basal appendage; stamens about as long as the petals, 6, with linear anthers; ovary superior to inferior, with a long and slender style; ovules numerous. Fruit capsular, three-valved, septicidally dehiscent; seeds numerous, variously winged. A genus of about 260 species from tropical America and the West Indies, with one African species. Named in honor of Dr. William Pitcairn, 1711-1791.

TYPE: *Pitcairnia bromeliifolia* L'Hérit.

Key to the species of *Pitcairnia*

1. Leaf blades 1-2 cm wide; bracts ovate-lanceolate, 5-10 mm long; flowers red; seeds with creamy-white appendage, tapering at base; Puerto Rico, Virgin Islands ..... 1. *P. angustifolia*
1. Leaf blades 0.8-1.2 cm wide; bracts ovate, 3-6 mm long; flowers yellow; seeds with brownish yellow appendage, truncate at the base; endemic to Guana Island (B.V.I.) ..... 2. *P. jareckii*

1. Pitcairnia angustifolia Aiton, Hort. Kew. 1: 401. 1789. Type: St. Croix, U. S. Virgin. Is. *Ryan s. n.,* (holotype: BM, photo at GH).

Pitcairnia latifolia Aiton, Hort. Kew. 1: 401. 1789. Type: West Indies. *Anderson s. n.* (BM).

Pitcairnia ramosa J. Jacq., Eclog. Pl. 1: 154, 117, f. 79. 1816. Lectotype: J. Jacq., *Eclog. Pl. 1: f. 79.* 1816, here designated.

Pitcairnia gracilis Mez in C. de Candolle, Monogr. Phan. 9: 407. 1897. Type: Guadeloupe. *L'Hérminier s. n.* (holotype: G, photo at GH).

Lithophytic or terrestrial herb; acaulescent or with stems to 10 cm long. Leaves numerous, in a dense fasciculate rosette, coriaceous, fimbriate-lepidote abaxially, 50-120 cm long, sometimes dimorphic with some reduced and forming tufts of dark-rigid spines at the base of the rosette; sheaths

conspicuous, triangular-ovate, dark brown, densely imbricate and usually forming a pseudobulb; blades linear-attenuate, long-acuminate, ca. 1-2 cm wide, arching, the margins armed with dark curved spines ca. 2-3 mm long. Scape erect or ascending, to 1.7 m tall, flocculose-glabrescent; bracteoles subfoliaceous, serrate, erect, linear-lanceolate, acuminate, 5-12 cm long, exceeding the internodes basally but shorter above. Inflorescence few- to many- branched; bracteoles like the upper scape ones, much shorter than the branches; branches laxly-flowered, ascending to spreading; bracts ovate to lanceolate, acuminate, 5-10 mm long. Flowers erect or sometimes pendent, pedicels slender, 4-12 mm long; sepals oblong, acuminate to obtuse, 1.3-2.3 cm long; petals red, 4-5.5 cm long, linear, acute; stamens about as long as the petals. Capsules ovoid, trigonous, apiculate, 1.2-2 cm long. Seeds elliptic-clavate, ca. 2 mm long, narrowly winged along one side; the wing creamy white, obliquely-enlarged at the apex and tapering at base

Note: In Puerto Rico this species exhibits two different morphologies which are also geographically defined. In most of the Island, the plants always have compound inflorescences. In the Sierra de Luquillo (Caribbean National Forest), the vast majority of the plants have simple, unbranched racemes. Although Read (Phytologia 8(5): 222. 1962) and Smith & Downs (Fl. Neotrop. Monogr. 14(1): 300. 1974) described the inflorescences of *P. angustifolia* as simple or branched, in Puerto Rico these two morphologies are evidently and consistently distinct. A new varietal name is provided here, for the taxon with simple, unbranched inflorescences, which in Puerto Rico is limited to the Sierra de Luquillo.

Key to the varieties of *Pitcairnia angustifolia*

1. Inflorescences with numerous usually compound branches; pedicels 5-8 mm long, sepals 1.4-2 cm long; Puerto Rico and U.S. Virgin Islands ..... 1. var. *angustifolia*
1. Inflorescences usually unbranched or with a few basal, short and simple branches; pedicels 6-15 mm long, sepals 1.6-2.6 cm long; mostly limited to the Sierra de Luquillo, eastern Puerto Rico ..... 1. var. *simplicior*

1. Pitcairnia angustifolia var. angustifolia

Fig. 43. A-C

Inflorescences with numerous mostly compound branches; pedicels 5-8 mm long, sepals 1.4-2 cm long.

General distribution: Puerto Rico, Virgin Islands, Antigua, Saba, St. Eustatius, St. Kitts, Montserrat, Guadeloupe, Dominica, Martinique, St. Lucia, St. Vincent, the Grenadines, Grenada, and Barbados.

Distribution in Puerto Rico and the Virgin Islands: Moist and wet forests from sea level to above 1000 m. Common along stream margins, road banks, ledges and exposed rocky outcrops. Recorded from Arecibo, Bayamón, Cabo Rojo, Coamo, Cayey, Dorado, Guayama, Hatillo, Jayuya, Juncos, Maricao, Mayagüez, Naguabo, Quebradillas, Río Grande, Salinas, San Germán, Toa Baja, Utuado, Vega Baja, Vieques, and Yauco; St. Croix, St. John, St. Thomas, and Tortola.

Common names: Puerto Rico: *Erizo, Píña cortadora, Píña de cuervo.*

Selected specimens examined: PUERTO RICO: Arecibo: Hato Arriba, *N.L. Britton & Cowell 1981* (US). Bayamón: *Stevenson & Johnston 911* (US). Coamo: Coamo road, *Goll et al. 633* (US). Río Grande: N Slope of El Yunque Mts., *Read 2049b* (US).Guayama: 3 mi. S of Guayama on Rt. 15, *Grant & Rundell 93-02268* (US). Juncos: Monte Florida, *Sintenis 2564* (US). Maricao: *Sargent 419* (US). Naguabo: along Río Cubuy to Meseta Falls, *Shafer 3162* (US). Río Grande: El Yunque, *Sargent 557* (US). Salinas: *Aguirre & Underwood 418* (US). San Germán: *Sargent 443* (US). Toa Baja: Candelaria, *Goll et al. 267* (US).Utuado: vicinity of Utuado, *E.G. Britton 5152* (US).Vega Baja: *Stevenson 456* (US). Vieques: Cerro Ventana, *Shafer 2877* (US). Yauco: *Underwood 644* (US). ST. CROIX: *Ryan s.n.* (Type photo). ST. JOHN: Maho Bay Quarter; Waterlemon Bay, *Acevedo-Rdgz. et al. 1940* (NY, VINPS). ST. THOMAS: Cowells Hill, *Eggers s.n.* (US). Water Island, *N.L. Britton et al. 135* (US). TORTOLA: Road Town to Sea Cow Bay, *N.L. Britton & Shafer 696* (US).

1. Pitcairnia angustifolia var. simplicior Proctor & Cedeño-Mald., var. nov. Type: Puerto Rico; Naguabo, Caribbean National Forest, Sierra de Luquillo, El Toro trail, *Proctor 47931* (holotype, SJ).

A P. angustifolia var. angustifolia inflorescentiis simplicibus differt.

Inflorescences usually unbranched or with a few basal, short and simple branches; pedicels 6-15 mm long, sepals 1.6-2.6 cm long.

General distribution: Similar specimens have been recorded from the island of Martinique; otherwise, this variety is apparently endemic to Puerto Rico.

Distribution in Puerto Rico: Ridges, slopes, streams, banks and edges of forest, usually in rocky situations; wet montane forest, above 500 m. With the exception of one specimen collected at the Carite Forest Reserve, this variety is otherwise restricted to the Sierra de Luquillo. Recorded from Cayey, Naguabo and Río Grande.

Selected specimens examined: PUERTO RICO: Naguabo: Sierra de Naguabo, *Shafer 3162* (US). Río Grande: El Yunque, *Sargent 557* (US); *Read 2049a, 2049b* (US).

2. Pitcairnia jareckii Proctor & Cedeño-Mald. sp. nov. Type: Guana Island, B.V.I., from ridge leading to Palm Point, elev. ca. 450-500 ft., 27 Oct 1991, *Proctor 47242* (holotype: SJ).

Fig. 42. A-H

Herba terrestris caulibus redactis. Inflorescentia ramosa ampla; rami ascendentes divergentes, ad 5 mm diametro, laxiflori, infra steriles. Bracteae ovatae acuminatae, 3-6 mm longae; flores plerumque erecti; sepala anguste deltata vel lineari-attenuata, acuta, 1-1.6 cm longa; petala flava, 3-4.5 cm longa, lineari-oblanceolata, acuta vel obtusa, aliquantum apiculata. Capsula ovoidea trigona, ca. 1.5 cm longa.

Terrestrial herb with reduced stems. Leaves numerous, in a dense fasciculate rosette, ascending, arching, coriaceous, fimbriate-lepidote abaxially, to ca. 1 m long; sheaths conspicuous, ovate, dark brown in the upper half, densely imbricate, forming a pseudobulb; blades linear-attenuate, long-acuminate, 0.8-1.2 cm wide, the margins armed with spines 1-3 mm long. Scape erect or ascending, to ca. 1.5 m tall, flocculose-glabrescent; bracteoles subfoliaceous, spinulose, erect, narrowly deltate to lanceolate, long-acuminate, exceeding the internodes basally but much shorter above. Inflorescence branched, very large and open; primary bracteoles like the upper scape ones; branches ascending, spreading, to 5 mm in diam., laxly-flowered, sterile below; bracts ovate, acuminate, 3-6 mm long. Flowers mostly erect, pedicels slender, 5-8 mm long; sepals narrowly-deltoid to linear-attenuate, acute, 1-1.6 cm long; petals yellow, 3-4.5 cm long, linear-oblanceolate, acute to obtuse, somewhat apiculate; stamens equaling or shorter than the petals. Capsule, ovoid, trigonous, ca. 1.5 cm long. Seeds elliptic-clavate, ca. 2 m long; narrowly winged along one side; the wing brownish yellow, obliquely enlarged at the apex, truncate at the base.

General distribution: Endemic to Guana Island

Note: The main morphological differences between *P. jareckii* and *P. angustifolia*, the only other species of this genus that is found in Puerto Rico and the Virgin Islands, are that it has narrower leaves (0.8-1.2 cm vs. 1-2 cm), and yellow flowers vs. red flowers.

Distribution in the Virgin Islands: Understory of dry forest, on rocky ridge of volcanic origin, 450-500 ft. Known only from the type locality on Guana Island, B.V.I.

8. TILLANDSIA

Tillandsia L., Sp. Pl. 286. 1753.

Caulescent or acaulescent herbs with variable habit and size. Leaves fascicled-rosulate or spirally distributed along the stem, polystichous or distichous, entire; blades ligulate to narrowly triangular; scales peltate, centrally symmetric. Inflorescence various, usually distinctly scapose, of distichous-flowered spikes or sometimes reduced to a single polystichous-flowered spike by the reduction of the spikes to single flowers or rarely the whole inflorescence reduced to a single flower; bracts conspicuous to minute. Flowers bisexual, mostly short-pedicellate; sepals usually symmetric, free or connate; petals free, without appendages; stamens included or exserted; ovary superior, glabrous; ovules usually many, caudate. Fruit a septicidal capsule; seeds many, erect, narrowly cylindrical or fusiform, the plumose appendage basal,



Fig. 42. A-H. *Pitcairnia jareckii.* **A.** Lower portion of habit with detail of leaf margin. **B.** Upper portion of habit and inflorescence. **C.** Inflorescence branch. **D.** Flower. **E.** Stamen. **F.** Apex of style showing stigma. **G.** Capsule. **H.** Seed. (A, photo by Lianna Jarecki; B-H, from *Proctor 47242*).

straight, white. A genus of about 540 species ranging from the southeastern United States to South America and the West Indies. Named in honor of Swedish physician and botanist Elias Erici Tillandz (1640-1693).

LECTOTYPE: *Tillandsia utriculata* L., designated by Britton & Millspaugh, Bahamas Fl. 64. 1920.

Key to the species of *Tillandsia*

1. Plants evidently caulescent, the stems branching; leaves to 8 cm long but usually less 2
   2. Leaves polystichous; stamens longer than the petals ..... 12. *T. tenuifolia*
   2. Leaves distichous, stamens much shorter than the petals 3
      3. Plants forming long, pendent masses; stems much elongate, up to several meters long, the internodes elongate, exposed; inflorescence a single pseudolateral flower ... 13. *T. usneoides*
      3. Plants forming globose masses; stems up to 10 cm long, the internodes very short, covered by the leaf sheaths; inflorescence evidently terminal, 1- to 5- (usually 2-) flowered ..... 10. *T. recurvata*
1. Plants acaulescent or with very short, unbranched stems; leaves usually more than 8 cm long 4
   4. Leaf sheaths inflated, broadly ovate to suborbicular, much and abruptly contracted into the blades 5
      5. Leaves densely covered with coarse-spreading scales throughout, having a velvety appearance; sterile portion of scape very short, infolded by the leaf sheaths .... 9. *T. pruinosa*
      5. Leaves densely covered with fine, appressed scales throughout, the surface smooth (non-velvety); sterile portion of scape elongated, covered by sterile bracteoles 6
         6. Leaves and sterile scape bracteoles straight, erect, shorter than the inflorescence ..... 1. *T. ariza-juliae*
         6. Leaves and sterile scape bracteoles contorted, spreading, longer than the inflorescence .....3. *T. bulbosa*
   4. Leaf sheaths about as thick as the blades, deltate to ovate, gradually attenuating into the blade 7
      7. Leaf blades linear-subulate, less than 5 mm wide at the base, filiform for about half their length or more 8
         8. Plants usually forming dense clumps of several plants; leaf blades filiform almost throughout, to 2 mm wide but usually narrower; bracts less than 1.5 cm long; sepals to 1.2 cm long; petals about 2 cm long ..... 11. *T. setacea*
         8. Plants usually solitary or forming clumps of few plants; leaf blades attenuating and becoming filiform for about half their length, usually more than 2 mm wide; bracts more than 1.5 cm long; sepals about 1.4 cm long or longer; petals about 2.5 cm long or more 9
            9. Leaf sheaths densely covered with subappressed to subspreading scales; inflorescence 14-25 cm long, its axis elongated, densely and pinnately branched; spikes sub-erect , straight ..... 2. *T. borinquensis*
            9. Leaf sheaths densely covered with appressed scales, seemingly glabrous and smooth; inflorescence, 5-12 cm long, its axis compressed, subdigitately to densely digitately branched; spikes divergent-spreading, arching-recurved ..... 5. *T. festucoides*
      7. Leaf blades deltate-attenuate, more than 5 mm wide at the base, filiform only near the apex 10
         10. Leaf blades with whitish transversal stripes, twisting around the scape..... 6. *T. flexuosa*
         10. Leaf blades concolorous, usually spreading, not twisting around the scape 11
            11. Leaves papery, chartaceous or subcoriaceous, thin, soft, flexuous; base of the leaf sheaths green, concolorous with the blades ..... 15. *T. variabilis*
            11. Leaves coriaceous, thick, stiff; base of the leaf sheaths dark brown or pale-ferruginous, contrasting with the blades. 12

12. Inflorescence compound; more or less laxly branched, primary fertile bracteoles not overlapping, exposing the internodes of the inflorescence 13
    13. Floral bracts densely imbricate, 2-2.7 cm long, hiding the internodes of the spikes ..... 7. *T. lineatispica*
    13. Floral bracts not imbricate, 1-1.8 cm long, exposing the internodes of the spikes ..... 14. *T. utriculata*
12. Inflorescence compound or simple; if compound, digitately to subdigitately or densely pinnately branched, the sheaths of the primary fertile bracteoles at least slightly overlapping and hiding the internodes of the inflorescence 14
    14. Floral bracts 3-5 × 1.5-2.5 cm ..... 4. *T. fasciculata*
    14. Floral bracts 1.5-2 × 0.8-1.2 cm ..... 8. *T. polystachia*

1. Tillandsia ariza-juliae L. B. Sm. & Jiménez, Phytologia 6: 433. 1959. Type: Dominican Republic; La Vega. *Ariza Julia s. n.* (holotype: US!).

Epiphytic, acaulescent herb, usually forming clumps. Leaves densely fasciculate, densely covered with fine appressed-cinereous scales; sheaths conspicuous, suborbicular, abruptly contracted into the blades, 3-4 cm long, inflated, forming a dense ovoid pseudobulb; blades involute, attenuate, erect, nearly straight, somewhat rigid, shorter than the inflorescence, 6-11 cm × 2-4 mm. Scape erect, hidden by sterile bracteoles; sterile bracteoles imbricate, subfoliaceous, with lanceolate to ovate sheaths infolding the scape and blades like the leaf blades. Inflorescence simple or few-branched, equaling to much longer than the leaves; primary bracteoles to 3 cm long, deltate-ovate, attenuate, chartaceous; spicate branches distichously-flowered, complanate, acute, 8-10 cm long, appressed-lepidote; bracts erect, ovate to ovate-lanceolate, acute, 2-3 cm long, chartaceous, nerved, pinkish, densely lepidote on the outside. Flowers sessile or subsessile; sepals oblong, acute, slightly apiculate, ca. 2 cm long, densely lepidote on the outside; petals tubular-involute, erect, bluish purple; stamens exserted. Capsule cylindrical, about 3 cm long.

General distribution: Dominican Republic and Puerto Rico.

Distribution in Puerto Rico: Moist forest about 700 m. Apparently very rare, if not overlooked for its similarity with *Tillandsia bulbosa* Hook. This species is known in Puerto Rico from only two specimens collected in Maricao.

Selected specimens examined: PUERTO RICO: Maricao: Maricao Insular Forest, *Winters s.n.* (US); *Cantero s. n.* (UPR).

2. Tillandsia borinquensis Cedeño-Mald. & Proctor, Harvard Pap. Bot. 4: 113. 1999. Type: Puerto Rico; Yauco. *R. García 3547* (holotype: MAPR; isotypes: UPR, UPRRP).
Tillandsia festucoides sensu Britton & P. Wilson (1923) and sensu Liogier & Martorell (1982), non Brongniart ex Mez, 1896.

Epiphytic, acaulescent herb, sometimes forming small clusters. Leaves numerous, forming a dense fasciculate rosette, about 30-60 cm long; sheaths subtriangular-ovate, conspicuous, gradually narrowing into the blade, dark brown, densely subappressed to subspreading lepidote; blades linear-subulate proximally, filiform-attenuate distally, infolded or involute, the lower parts also dark brown and subappressed-lepidote. Scape erect or ascending, the axis 2-4 mm thick; sterile bracteoles erect, densely imbricate, chartaceous, covered with subappressed scales, green, sometimes purplish tinged, the lower ones subfoliaceous, the upper ones filiform-laminate. Inflorescence twice-branched, generally dense at apex, more open below, about 14-25 cm long, from almost equaling to much exceeding the leaves; primary fertile bracteoles like the upper sterile bracteoles but the distal ones without the filiform apex, their sheaths about as equal or slightly shorter than the axillary branches; branches densely distichous, mostly 4- to 6-flowered, about 3-5 cm long, the lower subspreading, separate from each other and exposing the internodes, the upper densely clustered; bracts imbricate, ovate-oblong, acute, glabrous to densely lepidote on the outside, coriaceous or subcoriaceous, carinate, 1.8-2.2 cm long, exceeding the sepals, at least three times or more the length of the internodes of

the branches, green, sometimes purplish tinged. Flowers sessile to subsessile; sepals lanceolate to ovate-oblong, acute, 1.4-1.6 cm long, subcoriaceous, glabrous, carinate, connate proximally for 6-8 mm; petals 2.5-3.5 cm long, purple, stamens and pistil exserted. Capsule cylindrical-ellipsoid, short-pointed at apex, 2.4-2.8 cm long.

General distribution: Endemic to Puerto Rico.

Distribution in Puerto Rico: From dry scrub forest to wet forest, collected from 30-600 m. Relatively common. Recorded from Adjuntas, Aibonito, Arecibo, Ciales, Florida, Maricao, Morovis, Utuado and Yauco.

Selected specimens examined: PUERTO RICO: Adjuntas: E of Los Rábanos, Rt. 518 near jct with Rt. 135, *Ackerman & Campbell 2668* (US). Ciales: along trail Camino de la Ceiba towards Quebrada del Pozo Azul, *Acevedo-Rdgz. & Vicens 11845* (US). Utuado: 10 mi N from Adjuntas along road to Arecibo, *Grant & Rundell 93-02292* (US).

3. Tillandsia bulbosa Hook., Exot. Fl. 3: t. 173. 1825; *Platystachys bulbosa* (Hook.) Beer, Fam. Bromel. 83. 1857. Lectotype: Trinidad. Hook., *Exot. Fl. 3: t. 173. 1825*, designated by L. B. Smith & Downs, Fl. Neotrop. Monogr. 14: 994. 1977.

Epiphytic, acaulescent herb, variable in size, usually forming clumps. Leaves several, densely fasciculate, finely appressed cinereous-lepidote; sheaths conspicuous, suborbicular, 3-5 cm broad, abruptly contracted into the blades, inflated, imbricate, forming a dense ovoid pseudobulb; blades involute, subterete, attenuate, usually contorted and spreading, 7-30 cm × 2-4 mm, usually exceeding the inflorescence. Scape erect or ascending, straight or slightly curved; sterile bracteoles imbricate, subfoliaceous, their blades exceeding the inflorescence. Inflorescence erect or curved, sometimes pendulous, spicate, simple or digitate, green to red; primary bracteoles of the inflorescence densely lepidote-cinereous on the outside, the lower one subfoliaceous, the sheaths ovate, the blades usually longer than the spikes, the upper ones subfoliaceous to ovate, acute and usually shorter than the spikes. Spikes digitate, spreading, lanceolate, acute, complanate, 2-8 cm long; rachis slender, lepidote; bracts erect to subspreading, conduplicate, carinate, usually red, ovate-lanceolate, acute, 1-2 cm long. Flowers sessile or subsessile; sepals oblong, apiculate, about 12 mm long; petals linear, acute, 2.5-4 cm long, blue to bluish purple; stamens exserted. Fruit a cylindrical capsule, 3-4 cm long, pointed at the apex.

General distribution: Mexico, Guatemala, Belize, Honduras, Nicaragua, Costa Rica, Panama, Greater Antilles, Guadeloupe, Martinique, Trinidad, Tobago, Colombia, Venezuela, Guyana, Surinam, French Guyana, Ecuador, and Brazil.

Distribution in Puerto Rico: Thickets, slopes, ridges and woods, from semi-xeric scrub forest to moist forest, from about 100-800 m. Uncommon, recorded from: Arecibo, Desecheo Is., Maricao, Mayagüez, and San Germán.

Selected specimens examined: PUERTO RICO: Maricao: Camp. Santana Road, Maricao Insular Forest, *Schubert et al. 480* (US).

4. Tillandsia fasciculata Sw., Prodr. 56. 1788. Type: Jamaica. *Swartz s. n.* (lectotype: S-Sw.; isolectotype: P), here designated.

Mostly epiphytic, sometimes terrestrial or lithophytic, acaulescent herb, variable in size, usually forming clusters. Leaves numerous, fasciculate, forming crateriform rosettes, appressed lepidote-cinereous on both surfaces, mostly ascending, straight to arching, 30-70 cm long; sheaths conspicuous, ovate, 3-5 cm broad, dark brown; blades narrowly triangular-attenuate, about 2-3 cm wide at the base, carinate, involute. Scape erect, stout, 20-45 cm long; sterile bracteoles subfoliaceous, erect, imbricate, coriaceous, lepidote-cinereous, shortening toward the apex. Inflorescence variable, simple or compound, with spicate branches; primary bracteoles ovate, acuminate to long-acuminate, coriaceous, shorter than the spikes, red or reddish; spikes subdigitate, compressed, erect to spreading, sessile or subsessile, usually densely-flowered, ellipsoid to cylindrical, acute, 5-17 cm long; bracts erect, imbricate, ovate-elliptic, acute, slightly uncinate, mostly 3-5 cm long, rigid, subcoriaceous, carinate at least toward the apex, lepidote or glabrous, green or greenish yellow. Flowers sessile to subsessile, erect; sepals lanceolate, acute, carinate, shorter than the bracts; petals linear, erect, tubular, 4-6 cm long, white to purple;

stamens and pistil exserted. Capsule cylindrical-ellipsoid, 3-4 cm long.

General distribution: Florida, Mexico, Guatemala, Honduras, Salvador, Nicaragua, Costa Rica, Panama, Bahamas, Greater Antilles, St. Martín, Saba, Guadeloupe, La Desirade, Dominica, St. Lucia, St. Vincent, the Grenadines, Trinidad & Tobago, Venezuela, Colombia, Surinam, French Guiana, and Brazil.

Distribution in Puerto Rico and the Virgin Islands: Variable, from mangrove swamps and coastal areas to montane moist forest above 800 m. One of the most common bromeliads, especially in the limestone areas. Recorded from Adjuntas, Arecibo, Aibonito, Bayamón, Camuy, Carolina, Cayey, Ciales, Dorado, Guánica, Maricao, Mayagüez, Morovis, Ponce, Río Grande, Salinas, San Juan, Vega Alta, Vega Baja, Yauco, and Vieques; Guana Island, St. John, and St. Thomas.

Note. This species shows great variation over its range. Mez (in Engler, Das Pflanzenr. IV. 32 (Heft 100): 467-468. 1935) described several varieties of this species, of which two have been attributed to Puerto Rico: *T. fasciculata* var. *fasciculata* and *T. fasciculata* var. *venosispica* Mez (Britton & Wilson, 1923; Smith & Downs, 1977; Acevedo-Rodríguez et al., 1996). After examining all the Puerto Rican material at MAPR, UPR, SJ, and US, I have concluded that our specimens of *T. fasciculata* cannot be definitely assigned to any of the two varieties. Although in some cases weak distinctions could be made, most of our material falls intermediate between the putative varieties. Therefore, I have decided not to recognize the varietal distinctions proposed by Mez. A similar situation was described for Hispaniola (Zanoni et al, 1986).

Selected specimens examined: PUERTO RICO: Adjuntas: 10 mi N of Adjuntas, along road to Arecibo, *Grant & Rundell 93-02291* (US). Arecibo: 5 km S of Biáfara, *Acevedo-Rdgz. & Siaca 11702* (US); Hato Arriba, , *N.L. Britton & Cowell 1993* (US). Bayamón: Candelaria, *Goll et al. 278* (US). Carolina: Santa Barbara, *Goll et al. 194* (US). Ciales: along trail Camino de la Ceiba towards Quebrada del Pozo Azul, *Acevedo-Rdgz. & Vicens 11890* (US). Guánica: Mt. Ensenada, *N.L. Britton & Shafer 1935* (US). Maricao: *Sintenis 473* (US). Mayagüez: vicinity of Mayagüez; Ponce: NE of Ponce, *Heller s.n.* (US). Salinas: Bo. Lapa, E peak, Las Tetas de Cayey, *Proctor & Díaz 42239* (US). San Juan: Martín Peña, *Stevenson 1229* (US). Vega Baja: Vega Baja, *Heller & Heller 637* (US). Vieques: Lighthouse Peninsula, *Shafer 2804* (US). ST. JOHN: Cruz Bay Quarter; Battery Gut, near waterfall, *Acevedo-Rdgz. & Siaca 4169* (NY, US).

5. **Tillandsia festucoides** Brongn. ex Mez in C. de Candolle, Monogr. Phan. 9: 678. 1896. Type: to be sought among several syntypes*.

Epiphytic, acaulescent herb, sometimes forming clusters. Leaves numerous, densely fasciculate in rosettes, densely and minutely appressed-lepidote throughout, 15-40 cm long; sheaths narrowly deltate-ovate, conspicuous, dark brown; blades subulate-filiform. Scape erect or ascending, slender, 1-2 mm wide; sterile bracteoles erect, densely imbricate, subfoliaceous, sheathing, with long filiform blades reaching the inflorescence, chartaceous, pinkish or often bright red. Inflorescence bipinnate, sub-digitate to densely digitate, 5-12 (-17) cm long; primary fertile bracteoles like the upper scape bracteoles, their sheaths much shorter than the axillary branches; branches, few to several, arching-recurved especially after anthesis, linear in outline, 3-9 cm long; bracts erect, slightly imbricate, lanceolate-ovate, 1.5-2 cm long, exceeding the sepals, nerved, pale-appressed-lepidote, green, pinkish or red. Flowers subsessile; sepals lanceolate, acute or obtuse, 1.4-1.7 cm long, coriaceous, glabrous or sparsely lepidote, carinate and connate proximally for 6-8 mm; petals erect, tubular, linear, about 3 cm long, purple; stamens and pistil exserted. Capsule narrowly cylindrical, acute, 2.5-3 cm long.

General distribution: Mexico, Guatemala, Belize, Honduras, Nicaragua, Costa Rica, and Greater Antilles.

Distribution in Puerto Rico: From dry scrub forest to wet forest, collected from 30-600 m. Apparently rare, known only from Maricao and the Susúa Forest Reserve in Yauco. Specimens of *T. borinquensis*, a rather more widespread and common species, have been attributed to this species.

Selected specimens examined: PUERTO RICO: Maricao: *Sargent 454* (US).

Note: * The lectotypification of this name by L.B.Smith & Downs, (Fl. Neotrop. Monogr. 14:

914. 1977) is erroneous because the chosen lectotype is not part of the original material.

6. **Tillandsia flexuosa** Sw., Prodr. 56. 1788. Lectotype: Jacquin, *Select. Stirp. Amer. Hist. t. 63. 1763* (as a new name for *T. tenuifolia* sensu Jacquin 1763, non L., 1762), designated by L.B. Smith & Downs, Fl. Neotrp. Mongr. 14: 977. 1977.

Tillandsia aloifolia Hook., Exot. Fl. 3: *t. 205.* 1826; *Vriesea aloifolia* (Hook.) Beer, Fam. Bromel. 95. 1856. Type: Trinidad. *De Schack s.n.* (K, photo at US).

Epiphytic acaulescent herb, usually solitary. Leaves several, fasciculate, subcoriaceous, curved, usually spirally twisted around the scape and forming a dense sub-bulbous rosette, densely appressed-lepidote, usually with broad white transverse stripes, ovate to ovate-lanceolate, long-attenuate, 8-30 (-50) cm long, the outer usually shorter and sometimes scale-like; sheaths usually undifferentiated from the blade or gradually tapering into it. Scape ascending, usually curved near the base; sterile bracteoles erect, sheathing, the lowest ones foliaceous, the upper ones linear-attenuate to lanceolate, obtuse or acute, slightly apiculate, shorter than the internodes, lepidote. Inflorescence simple or laxly twice-branched, much exceeding the leaves; primary bracteoles like the scape bracteoles, shorter than the sterile bases of the branches; the branches few, ascending, to 40 cm long, laxly-flowered, the rachis slender and flexuous; bracts, spreading, elliptic-lanceolate, acute, 2-3 cm long, about as long as or slightly shorter than the sepals, chartaceous, prominently nerved. Flowers with pedicels 3-5 mm long; sepals linear-elliptic, obtuse, 2-2.5 cm × 5-7 mm; petals linear, acute, to 4 cm long, white, rose or purple; stamens exserted. Capsule slender, cylindrical, acuminate, to 7 cm long. Clusters of plantlets commonly developing from seeds germinating in the dried inflorescences.

General distribution: Florida, Panama, Bahamas, Greater Antilles, St. Vincent, the Grenadines, Grenada, Colombia, Venezuela, Trinidad, Tobago, Guyana, Surinam, and French Guiana.

Distribution in Puerto Rico: Woods in coastal moist forest. Rare. Recorded from San Juan and recent collections from Laguna Tortuguero in Manatí and Susúa forest.

Selected specimens examined: PUERTO RICO: San Juan: Santurce, *Heller & Heller 1394* (NY, US).

7. **Tillandsia × lineatispica** Mez in C. de Candolle, Monogr. Phan. 9: 699. 1896. Type: St. John, U.S. Virgin Is., *Eggers 3104* (holotype: B, photo at US).

Terrestrial or lithophytic acaulescent herb, usually in small clusters. Leaves numerous, fasciculate, ascending, the lower spreading, forming dense rosettes, densely lepidote throughout, about 60-95 cm long; sheaths conspicuous, dark brown, ovate-elongate, 5-8 cm wide; blades narrowly triangular, attenuate to a filiform recurved apex, involute. Scape erect, stout, to about 1.5 m long, glabrous; sterile bracteoles erect, coriaceous, imbricate, sheathing, red, the lower subfoliaceous, shortening toward the apex of the scape, the upper ones ovate-lanceolate, long- to short-acuminate; inflorescence a polystichous panicle, 1- to 3-branched, exceeding the leaves; fertile bracteoles ovate to ovate-lanceolate, acute to acuminate, red, 2.5-5 cm long; the branches ascending; spikes erect, short-stipitate, strict, linear, 10-40 × ca. 1 cm, densely-flowered; bracts, erect, imbricate, coriaceous, carinate, nerved, ovate, acute, 2-2.7 cm long, shorter than the sepals, purplish red with purple margins, the apices slightly spreading or turned outwards. Flowers subsessile, erect; sepals narrowly elliptic-lanceolate, acute, 2.5-3 cm long; petals white, linear, tubular, acute, to 3.5 cm long; stamens and pistil exserted. A sterile hybrid not producing fruit (Acevedo-Rdgz. 1996).

General distribution: Endemic to Puerto Rico and the Virgin Islands.

Distribution in Puerto Rico and the Virgin Islands: Rare, known only from a few populations in the islands of Vieques, Culebra and St John.

Note: T. lineatispica seems to be a hybrid between *T. utriculata* and *T. fasciculata* (Acevedo-Rdgz., 1996).

Selected specimens examined: PUERTO RICO: Culebra: on peak 0.6 km due South of Playa Resaca, *G. R. Proctor 39984* (SJ). Vieques: Cerro Ventana (Mt. Pirata), *Shafer 2979* (US). ST. JOHN: *Eggers 3104* (photo at US-2). Fish Bay, hillside overlooking Bay, *Mori & Woodbury 17074* (NY);

Half Moon Beach at Sun Bay, *Hansen et al. 9460* (FTG); Adrian, 600' *Eggers 3104-B* (photo at US); Cruz Bay Quarter, Battery Gut, *Acevedo-Rdgz. & Siaca 4170* (F, MO, NY, UPR, US).

8. Tillandsia polystachia (L.) L., Sp. Pl. ed. 2, 410. 1762; *Renealmia polystachia* L., Sp. Pl. 286. 1753. Lectotype: West Indies. A plate of the Boerhaave set of Plumier illustrations at the library of Rijksuniversiteit, Groningen, here designated*.

Tillandsia angustifolia Sw., Prodr. 57. 1788. Type: Jamaica. *Swartz s. n.* (holotype: S-Sw.; isotype: BM, photo at GH, NY).

Epiphytic or sometimes lithophytic, acaulescent, rather variable herb, solitary or in clusters. Leaves numerous, in a fasciculate rosette, densely pale-appressed-lepidote throughout, about 20-65 cm long; sheaths conspicuous, ovate-elliptic, ca. 5-9 × 2-6 cm, dark brown; blades deltate-attenuate, gradually tapering into a filiform apex, arching to recurving, the margins involute. Scape erect or ascending, the sterile base shorter than the leaves; scape bracteoles foliaceous, reducing toward the apex, with erect, densely imbricate sheaths and elongate spreading-recurved blades, green, red or purplish. Inflorescence variable, usually subcylindric or narrowly fusiform and exceeding the leaves, rarely simple to more commonly congested and subdigitate, or with a polystichously and densely branched axis to 45 cm long with short internodes; primary fertile bracteoles longer or shorter than the branches, short- or long-acuminate, reduced towards apex of the inflorescence (more commonly the lower primary fertile bracteoles are subfoliaceous with sheaths infolding the bases of the branches and involute-filiform blades much longer than the branches, the upper ovate-lanceolate, short- or long-acuminate, and shorter than the branches); branches erect, ascending or spreading, straight or curved, linear, about 3-14 cm long, complanate, densely-flowered; bracts erect, appressed, rigid, imbricate, ovate-oblong, broadly acute or obtuse, mucronulate, 1.5-2 cm long, longer than the sepals, much longer than the internodes, coriaceous, smooth, glabrous or obscurely lepidote, carinate. Flowers subsessile, erect; sepals linear-elliptic to ovate-oblong, about 1.2-1.5 cm long, acute or mostly obtuse, coriaceous, even, glabrous, carinate; petals erect, tubular, ligulate, about 3 cm long, blue or violet; stamens and pistil exserted. Capsule cylindrical-ellipsoid, pointed, 2.5-4 cm long.

General distribution: Mexico to Bolivia.

Distribution in Puerto Rico: Variable, from dry scrub forest at sea level to moist and wet forests about 800 m. Very common and widespread, probably in all municipalities; recorded from Aguadilla, Arecibo, Cayey, Coamo, Comerío, Fajardo, Florida, Jayuya, Loíza, Manatí, Maricao, Mayagüez, Mona Island, Ponce, Salinas, Utuado, Vega Alta, and Yauco.

Common Names: Puerto Rico: *Parásita, Piñón.*

Note. *This lectotypification supersedes a neotypification by L.B. Smith & Downs (1977) of a Plumier specimen at P (see note under *Aechmea nudicaulis* for an explanation).

Selected specimens examined: Puerto Rico: Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10740* (UPRRP, US). Cayey: 13 km N of Cayey, *Underwood 364* (US). Maricao: *Sargent 711* (US). Mayagüez: 10 mi. E of Mayagüez, *Grant & Rundell 93-02289* (US). Utuado: vicinity of Utuado, N.L. *Britton & Cowell 1019* (US).

9. Tillandsia pruinosa Sw., Fl. Ind. Occid. 1: 594. 1797. Type: Jamaica. *Swartz s. n.* (holotype: S-Sw., R-6148).

Tillandsia breviscapa A. Rich. in Sagra, Hist. Fis. Cuba, Bot. 11: 265. 1850. Type: Cuba. *Sagra s. n.* (holotype: P, photo at GH, NY).

Small, epiphytic acaulescent herb, usually forming clusters. Leaves several to numerous, about 10-14 cm long, densely fasciculate, densely cinereous-lepidote throughout with coarse spreading scales having a velvety appearance; sheaths very conspicuous, broadly elliptic-ovate to suborbicular, 2-4 × 1.5-2 cm, inflated, forming a dense and ovoid pseudobulb, much wider than the blades and abruptly contracted into them, the inner ones closely infolding the scape, dark brown; blades ascending or spreading, recurved or contorted, usually exceeding the inflorescence, involute, narrowly deltate, gradually attenuate from a 4-7 mm wide base to a filiform apex. Scape erect, the sterile base short, wholly infolded by leaf sheaths; sterile bracteoles foliaceous. Inflorescence simple or rarely digitate with 2-5 spikes; primary fertile bracteoles subfoliaceous, densely cinereous-

lepidote; spikes densely and distichously 5- to 15-flowered, to 7 × 4 cm, but usually much smaller, ellipsoid-ovoid, complanate; bracts erect, ovate, acute, 2-2.6 cm long, much exceeding the sepals, subcoriaceous, pink at anthesis, densely lepidote. Flowers sessile; sepals broadly elliptic-ovate or oblong, obtuse, 1-1.8 cm long, sparsely lepidote or glabrous, subcoriaceous, carinate; petals linear, obtuse or acute, about 3 cm long, bluish violet; stamens exserted. Capsule cylindrical-ellipsoid, pointed, about 3-5.5 cm long.

General distribution: Florida, Mexico, Guatemala, Honduras, Costa Rica, Greater Antilles, Colombia, Venezuela, Ecuador, and Brazil.

Distribution in Puerto Rico: Slopes, ridges and river margins of scrubby semi-xeric to moist forest, about 130-450 m. Very rare; known only from Yauco.

Selected specimens examined: PUERTO RICO: Yauco: Susúa Forest Reserve, trail from reserve office N along Río Loco, *Axelrod & Chavez 4038* (US).

10. Tillandsia recurvata (L.) L., Sp. Pl. ed. 2, 410. 1762; *Renealmia recurvata* L., Sp. Pl. 287. 1753, excluding var. β. Lectotype: Jamaica. Sloane, *Voy. Jamaica 1: t. 121, f. 1. 1707*, designated by L. B. Smith, *Proc. Amer. Acad. Arts Sci.* 70 : 208. 1935.

Tillandsia uniflora Kunth in Humb., Bonpl. & Kunth, Nov. Gen. & Sp. 1 [quarto ed.]: 290. 1816. Type: Mexico; Guerrero. *Humboldt & Bonpland s. n.* (holotype: P).

Tillandsia recurvata f. *major* André, Bromel. Andr. 65. 1889. Type: Puerto Rico; Mayagüez. *Sintenis 265* (BM).

Epiphytic, lithophytic or sometimes terrestrial caulescent herb, also growing on elevated utility wires and cables; forming dense, globose or mat-like clumps. Stems simple or branched, curved, typically shorter than the leaves, 1-10 cm long; roots few, short, slender. Leaves distichous, 3-17 cm long, densely lepidote; sheaths almost inconspicuous, thinly elliptic-ovate; blades usually strongly contorted and recurved, occasionally spreading or erect, filiform. Scape to about 13 cm long, punctate-lepidote throughout; scape bracteoles linear, 1 or sometimes 2 immediately below the inflorescence. Inflorescence a simple, dense, few-flowered raceme, erect to recurved; floral bracteoles lanceolate, 1-1.5 cm long, nerved, punctate-lepidote. Flowers 1-5, usually 2, subsessile; sepals linear-lanceolate, acute, shorter than the bracts; petals linear, narrow, bluish or purplish, 2-2.2 cm long, stamens included. Capsule cylindric-ellipsoid, acuminate, 2-2.5 cm long. Seeds with comose hairs, 2-2.5 cm long.

General distribution: Southern United States (Arizona, Texas, and Florida), Mexico, Guatemala, Honduras, El Salvador, Nicaragua, Bahamas, Greater Antilles, Anguilla, St. Martín, St. Barthelemy, Antigua, Saba, St. Eustatius, St. Kitts, Nevis, Redonda, Montserrat, Guadeloupe, Martinique, St. Lucia, Colombia, Venezuela, Ecuador, Peru, Bolivia, Brazil, Chile, Paraguay, Uruguay, and Argentina.

Distribution in Puerto Rico & the Virgin Islands: Variable, probably including all moisture regimens and elevations, although probably most common in drier areas of the Island. Of ample occurrence, probably in every municipality and forest reserve; St. Croix and St. John.

Common Name: Puerto Rico: *Nidos de gungulén.*

Selected specimens examined: PUERTO RICO: Arecibo: Bosque de Río Abajo, *Acevedo-Rdgz. 181* (SJ). Cabo Rojo: West of Cabo Rojo, *Heller 4427* (US). Ciales: Casa Blanca, *Sargent 3047* (US). Coamo: *Sintenis 3023* (US). Desecheo Island, *N.L. Britton et al. 1576* (US). Guánica: Reserva Forestal Guánica, *Boom 9970, 10025* (US). Guayama: *Underwood 427* (US). Isabela: Guajataca Gorge, *Acevedo-Rdgz. & Cedeño 10198* (UPRRP, US). Mayagüez: University of Puerto Rico, Mayagüez Campus, *Strong et al. 435* (US). Mona Island: *N.L. Britton et al. 1813* (US). Morovis: Bo. Río Grande, along Rd. 155 ca. 0.9 km. by road N of River (Río Grande de Manatí), *Proctor & Concepción 42319* (US). Ponce: *Prey 65* (US). Vieques: 1.5 km N of Punta Carenero, ca. 6 km E of Camp García, *Fosberg 57527* (US). ST. CROIX: Bassin, *Ricksecker 272* (US). South shore near Fanny's Fancy, *Seligson 41* (US). Great Pond, *Fosberg 53971* (US). St. La Grange, *Raunkiaer s.n.* (US). ST. JOHN: Coral Bay Quarter; trail to Fortsberg, *Acevedo-Rdgz. 4096* (NY, US).

11. Tillandsia setacea Sw., Fl. Ind. Occid. 1: 593. 1797. Type: Jamaica. *Swartz s. n.* (holotype: S-Sw., R-6154, photo at GH).

Tillandsia bromoides Mez, Repert. Spec. Nov. Regni Veg. 12: 419. 1913. Type: Dominican Republic; Barahona. *Fuertes s. n.* (holotype: B, destroyed).

Epiphytic, acaulescent herb, usually forming clumps of several plants. Leaves numerous, densely fasciculate, ascending or spreading, straight, curved or arching, 15-30 cm long, usually exceeding the inflorescence but sometimes short, appressed-lepidote throughout; sheaths triangular-ovate, conspicuous, dark brown-ferruginous, often keeled; blades stiff, involute, filiform, to 2 mm wide but usually less than 1 mm wide for most of their length. Scape erect, slender, sparsely lepidote; sterile bracteoles erect, densely pale-appressed-lepidote, imbricate, with lanceolate sheaths infolding the scape, the blades filiform, chartaceous. Inflorescence erect, bipinnate or frequently simple and distichous-flowered, slenderly ellipsoid, open at least below, to 12 cm long but usually much less; axis slender, lepidote, somewhat zigzagging; primary bracteoles like the upper scape bracteoles, sub-erect , the sheath shorter than the axillary spike but the blade usually much exceeding it; spikes subsessile, erect to subspreading, very short and dense, few-flowered, complanate; bracts erect, concave, imbricate, ovate, acute or acuminate, slightly exceeding the sepals, subcoriaceous, densely pale-appressed-lepidote. Flowers subsessile; sepals elliptic-oblong, acute, 7-12 mm long, carinate; petals erect, tubular, linear, acute, dilated at the apex, about 2 cm long, violet; stamens and pistil exserted. Capsule narrowly cylindrical, about 2.5 cm long.

General distribution: Florida, Mexico, Guatemala, Greater Antilles, and Brazil.

Distribution in Puerto Rico: Thickets, slopes, ridges and woods, from semi-xeric scrub forest to moist forest, from sea level to about 500 m. Relatively common. Recorded from: Adjuntas, Arecibo, Barranquitas, Camuy, Comerío, Hatillo, Juana Díaz, Mona Island, Ponce, Utuado, and Yauco.

Selected specimens examined: PUERTO RICO: Arecibo: W. Sabana Hoyos, *Acevedo-Rdgz. & Chinea 11664* (US). Juana Díaz: Peña de las Cuevas, near Juana Díaz, *E.G. Britton & Marble 2295* (US). Ponce: Río San Patricio, *Sargent 3130* (US). Utuado: Road from Utuado to Arecibo, *Underwood 807* (US).

12. Tillandsia tenuifolia L., Sp. Pl. 286. 1753. Lectotype: without locality. *Royen s. n.* (L), designated by L.B. Smith & Downs, Fl. Neotrop. Mongr. 14: 829. 1977.

Tillandsia pulchella Hook., Exot. Fl. 2: *t.* 154. 1825. Type: Trinidad. *De Schack s. n.* (holotype: K).

Tillandsia pulchra Hook., Exot. Fl. 2: *t.* 154. 1825. Type: Cultivated from Trinidad.

Tillandsia subulata Vell., Fl. Flumin. 133. 1829 ["1825"]; Icon. 3: pl. 127. 1831 ["1827"]. Type: Brazil; Rio de Janeiro. *Vellozo s. n.* (not located).

Epiphytic, sometimes lithophytic or terrestrial caulescent decumbent herb. The stems slender, elongate, branching and spreading, to 25 cm long, proximally covered with remnants of old sheaths. Leaves densely polystichous along the stem, 4-8 cm long, densely and minutely appressed-lepidote throughout; sheaths small, 4-7 mm wide, deltate-ovate to linear, abruptly constricted into the blade of the lower leaves, barely distinct from the blades of the upper leaves; blades narrowly deltate-attenuate, 2-4 mm wide at the base, tapering gradually and becoming filiform, spreading to mostly ascending or erect, straight or curved, the margins involute. Scape erect or ascending, slender, about 3-7 cm long; scape bracteoles erect, slightly imbricate, with ovate-lanceolate sheaths 8-10 mm long, abruptly constricted into filiform-caudate blades 2-3 cm long, membranaceous, pinkish. Inflorescence short, its axis about 1-1.5 cm long, equaling or exceeding the leaves, simple, densely polystichously-flowered, ovoid; bracts like the scape bracteoles but smaller and with the blades much reduced, their laminar sheath slightly exceeding the sepals, punctulate-lepidote, nerved. Flowers 4-10, sessile, erect; sepals lanceolate, acute, glabrous, about 6-10 mm long, membranaceous, carinate; petals blue, white, or rose, about 20 mm long, the claw linear, the blade oblong, broadly obtuse; stamens and style exserted. Capsule cylindrical, apiculate, about 1.5-2 mm long.

General distribution: Greater Antilles, Martinique, St. Lucia, Venezuela, Guyana, French Guiana, Surinam, Bolivia, Brazil, Paraguay, and Argentina.

Distribution in Puerto Rico: Moist and wet forest, above 500 m. Recorded from Adjuntas, Ciales, Cidra, Coamo, Maricao, Salinas, and Yauco.

Selected specimens examined: PUERTO RICO: Coamo: Las Piedras Chiquitas, *Liogier & Proctor 36184* (US).Yauco: Bo Río Prieto, upper W slope of Monte Membrillo, *Axelrod & Bayman 7364* (US).

13. Tillandsia usneoides (L.) L., Sp. Pl. ed. 2, 411. 1762; *Renealmia usneoides* L., Sp. Pl. 287. 1753; *Dendropogon usneoides* (L.) Raf., Fl. Tellur. 4: 25. 1838. Lectotype: "Americas." Collector unknown (BM-Cliff. 558543) designated by Gouda in Görts-van Rijn (ed.), Fl. Guianas 189: 68, 1987.

Epiphytic, caulescent, herb, typically forming pendent masses to a meter or more in length. Stems branched, sympodial, flexuous, recurved, less than 1 mm in diam., internodes 3-6 cm long, the branches bearing 2-3 leaves. Leaves distichous, 2-5 cm long, densely cinereous-lepidote; sheaths slightly dilated, elliptic-lanceolate, tightly enveloping the base of the internodes, 4-8 mm long; blades filiform, less than 1 mm diam. No reproductive specimens of this species were located from Puerto Rico or the Virgin Islands. The flowers and fruits have been reported by others as follows. Inflorescence reduced to a single pseudolateral flower; bract ovate, apiculate or caudate, densely lepidote, shorter than the sepals. Flowers subsessile; sepals narrowly ovate, acute, to 7 mm long, thin, strongly nerved, glabrous, short-connate, light green; petals narrow, acute or obtuse, 9-11 mm long, pale green or yellowish green; stamens included, exceeding the pistil. Capsule 2-3 cm long, cylindrical, short-beaked.

General distribution: From the southeastern United States to Chile and Uruguay, including the West Indies.

Distribution in Puerto Rico & the Virgin Islands: From rather open, dry, scrubby forest to thickets, woodlands and edges of moist forest; ranging from near sea level to about 600 m. Arecibo, Cabo Rojo, Coamo, Guánica, Guayama, Lajas, Mayagüez, Ponce, Salinas, and Yauco; St. Croix.

Common name: Puerto Rico: *Barbas de úcar.*

Selected specimens examined: PUERTO RICO: Arecibo: Bo. Río Arriba, *Axelrod et al. 9020* (UPRRP). Cabo Rojo: Salinas de Cabo Rojo, *Sintenis 564* (US). Coamo: vicinity of Coamo Springs, *N.L. Britton & Cowell 1330* (US). Guánica: Roadside in and around Guánica, *Grant & Rundell 93-02269* (US). Guayama: Aguirre, *Underwood 365* (US). Lajas: La Parguera, near km. 2, *Schubert & Winters 363* (US). Ponce: Between Ponce & Coamo, *Heller & Heller 513* (US). Yauco: *Stevenson & Fink 3956* (US). ST. CROIX: Caledonia Gut, NW corner of Island, *Fosberg 55384* (US). Jakobsberg, Lang's Peak, *Fosberg 54153* (US). Signal Hill, *Ricksecker 267* (US).

14. Tillandsia utriculata L., Sp. Pl. 286. 1753. Neotype: Jamaica. *W. Till 9014* (WU), designated by Till in C.E. Jarvis et al. (ed.), Regnum Veg. 127 : 94. 1993.

Tillandsia ramosa Sweet, Hort. Brit. 425. 1826, *nom. nudum.*

Tillandsia sintenisii Baker, J. Bot. 26: 12. 1888. Type: Puerto Rico; Cayey. *Sintenis 2134* (holotype: K; isotypes: GH, US!).

Figs. 43. G-I; 65. D

Small to large herbs, 0.5-2 m tall, epiphytic or sometimes lithophytic, acaulescent or with short stems, solitary or in clusters. Leaves numerous, densely fasciculate, rosulate, 20-100 cm long, densely pale-appressed-lepidote throughout, coriaceous; sheaths conspicuous, their bases dark brown, broadly ovate-elliptic, 2-9 cm wide; blades narrowly deltate, gradually tapering or long-attenuate, the inner sub-erect , the outer spreading and usually recurving. Scape erect, to 1.5 m long, glabrous; sterile bracteoles erect, sheathing, the lower subfoliaceous, the upper bladeless, ovate, acute, shortening toward the apex. Inflorescence variable in length, exceeding the leaves, once to thrice-branched, very large and open, glabrous; fertile bracteoles like the upper scape bracteoles, about 1.5-3.5 cm long, shorter than the sterile base of the branches, often dark violet; branches ascending; spikes linear in outline, curved, 8-35 cm long, their bases with several sterile, imbricate bracteoles, laxly- and distichously-flowered; floral bracts erect, infolding the base of the flowers, not imbricate, equaling or shorter than the internodes, ovate-lanceolate, acute or obtuse, 1-1.8 cm long, shorter than the sepals, nerved,

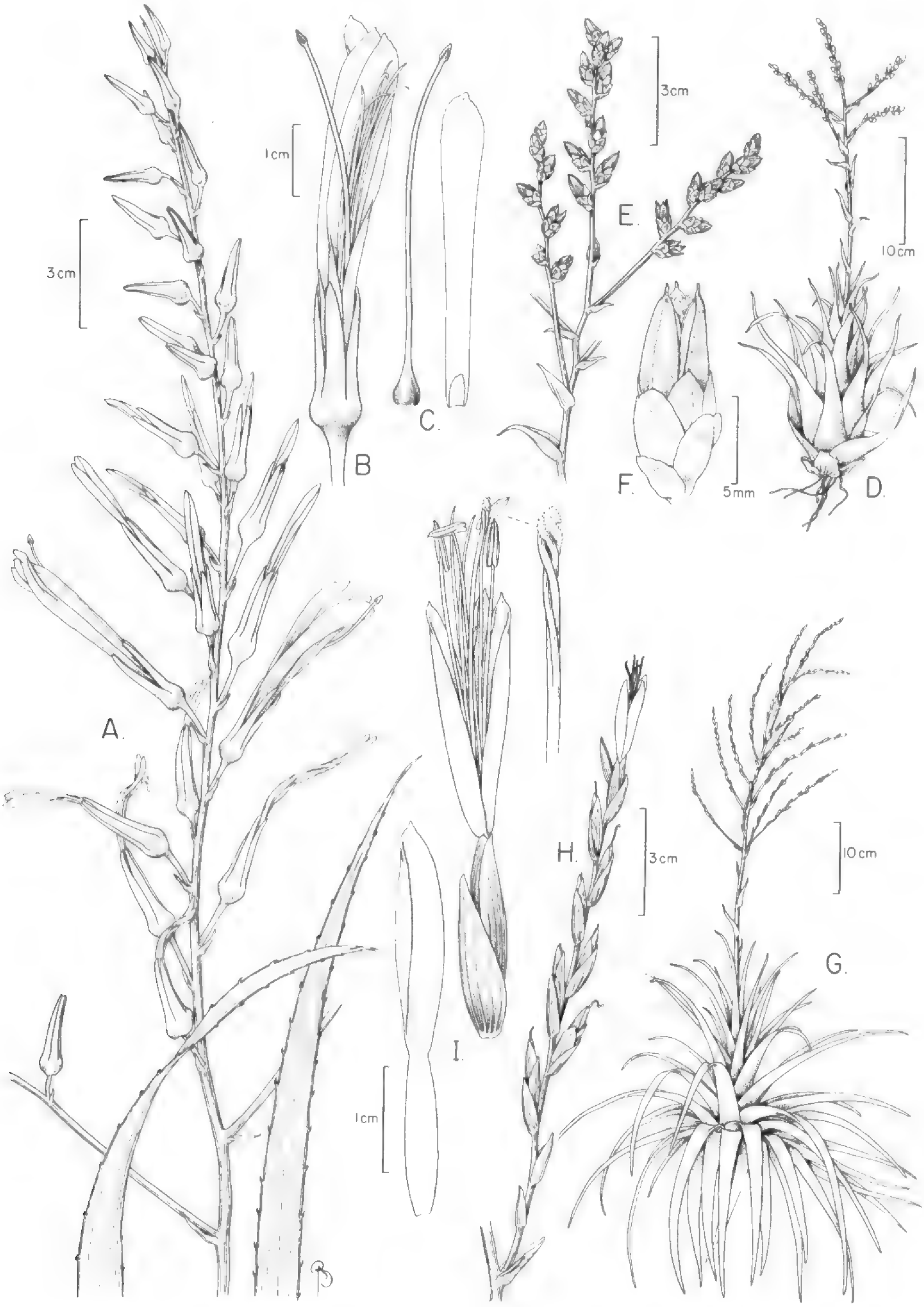


Fig. 43. A-C. *Pitcairnia angustifolia var. angustifolia.* **A.** Inflorescence, and leaf tips. **B.** Flower. **C.** Pistil and petal. **D-F.** *Catopsis floribunda.* **D.** Habit. **E.** Infructescence. **F.** Capsule. **G-I.** *Tillandsia utriculata.* **G.** Habit. **H.** Inflorescence branch. **I.** Tepal, flower, and detail of stigma. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

subcoriaceous, green with a broad, membranaceous, often dark purple margin, ecarinate. Flowers erect, with pedicels 2-4 mm long; sepals elliptic-oblong or oblanceolate, obtuse, 1.4-1.8 cm long, subcoriaceous, nerved, with membranaceous margins; petals erect, tubular, linear, acute, 3-4 cm long, white, creamy or yellowish; stamens and pistil exserted. Capsule narrowly cylindrical-ellipsoid, pointed, 3-5 cm long; seed with long apical comose hairs.

General distribution: Southeastern United States (Georgia and Florida), Mexico to Costa Rica, Bahamas, Greater Antilles, Lesser Antilles, Trinidad, Tobago, and Venezuela.

Distribution in Puerto Rico & the Virgin Islands: Common from coastal, dry scrub forests to moist and wet forests at about 800 m. Aguadilla, Bayamón, Cayey, Coamo, Culebra, Desecheo, Fajardo, Icacos, Maricao, Mona Island, Río Grande, Sabana Grande, Salinas, San Juan, Vieques, and Yauco; Anegada, Guana Island, St. Croix, St. John, and St. Thomas.

Selected specimens examined: PUERTO RICO: Aguadilla: Bo. Caimital Bajo Aibonito, *Acevedo-Rdgz. et al. 13444* (US). Bayamón: *Stevenson 3926* (US). Cayey: *Sintenis 2134* (US). Coamo: Coamo Springs, *Underwood 588, 589* (US). Culebra: *N.L. Britton & Wheeler 187* (US). Desecheo Island, *N.L. Britton et al. 1587* (US). Maricao: *Sargent 662* (US). Mona Island, *Otero & Chardon 914* (US). San Juan: Martín Peña, *Stevenson 3700* (US). Vieques: Cayo Puerto Real, *Shafer 2769* (US). Yauco: Susúa, *Liogier 9903* (US). ANEGADA: Settlement, *N.L. Britton & Fishlock 1024* (US); East side of Flamingo Pond, *Acevedo-Rdgz. 10979* (US). ST. CROIX: Crequis, *Ricksecker 440* (US). Maroon Ridge, seaward slope ca. 1 km SE of Hamms Bluff, *Fosberg 60875* (US). Salt Pond, *Ricksecker s.n.* (US). Sandy Point Peninsula, *Fleming 251* (US). Sandy Point, *Gardner 251* (US). ST. JOHN: Coral Bay Quarter; Road to Bordeaux, *Acevedo-Rdgz. & Siaca 5065* (K, MO, NY, UPRRP, US). ST. THOMAS: Bremer's Bay, N.L. *Britton & E.G. Britton 255* (US). Univ. of the V.I. campus, *Fosberg 59410* (US).

15. Tillandsia variabilis Schltdl., Linnaea 18: 418. 1844. Type: Mexico; Veracruz. *Schiede s. n., Jan. 1829*, (lectotype: HAL 45636.1; isolectotype: HAL 45636. 2), designated by W. Weber, Feddes Repert. 95: 597-598. 1984.

Tillandsia valenzuelana A. Rich in Sagra, Hist. Fis. Cuba, Bot. 11: 267. 1850. Type: Cuba. *Sagra s. n.* (holotype: P).

Tillandsia sublaxa Baker, J. Bot. 25: 280. 1887. Type: Jamaica; Westmoreland. *Purdie s. n.* (holotype: K).

Tillandsia domingensis Mez, Repert. Spec. Nov. Regni Veg. 16: 73. 1919. Type: Dominican Republic. *Tuerckheim 3250* (holotype: B, n.v., photo at NY).

Epiphytic or sometimes lithophytic, acaulescent herb, solitary or in clusters. Leaves numerous, fascicled, rosulate, 10-45 cm long, the outer ones commonly reduced to scale-like sheaths, cinereous-lepidote throughout, occasionally becoming glabrous above, green, red, or reddish green; sheaths conspicuous, ovate, 1.5-5 cm long; blades ascending or spreading, involute, 7-20 mm wide at the base, narrowly triangular-attenuate to an almost filiform apex. Scape slender, glabrous, 7-30 cm long, erect or ascending, straight or curved; sterile bracteoles erect, sheathing, imbricate, the lower ones subfoliaceous with spreading almost caudate blades, the upper ones ovate-lanceolate, 1.8-2 cm long, acute, apiculate or short-acuminate, densely lepidote, pinkish or reddish green. Inflorescence erect or ascending, simple or pinnately compound, shorter or mostly longer than the leaves; primary fertile bracteoles like the upper sterile bracteoles; spikes few, oblong, ellipsoid or lanceolate, acute, complanate, slightly flexuous, laxly- or mostly densely-flowered, 5-20 cm long; bracts erect or slightly divergent and exposing the rachis, about two to three times as long as the internodes, elliptic-oblong or ovate-lanceolate, obtuse, acute or apiculate, 1.5-2 cm × 6-8 mm, slightly or much exceeding the sepals, subcoriaceous, nerved, glabrescent, pink or red. Flowers subsessile; sepals elliptic-oblong, obtuse or acute, carinate, 1.3-1.6 cm long; petals linear, acute, 2.5-3 cm long, blue or bluish violet; stamens exserted. Capsule ellipsoid, acute, 2-3 cm long; seeds with white coma about 1.5 cm long.

General distribution: Southern Florida, Mexico to Colombia, Venezuela, Ecuador, Bolivia, and the Greater Antilles.

Distribution in Puerto Rico: Moist areas; thickets, woodlands and moist forest, from near sea level to about 830 m. Very common. Recorded

from Adjuntas, Aibonito, Arecibo, Barceloneta, Barranquitas, Bayamón, Cabo Rojo, Ciales, Cidra, Dorado, Florida, Isabela, Juana Díaz, Quebradillas, Maricao, Salinas, Utuado, Vieques, and Yauco.

Selected specimens examined: PUERTO RICO: Arecibo: Cambalache Forest Reserve, along Piletas trail, *Axelrod & Ackerman 5801* (US). Bayamón: vicinity of Bayamón, *Liogier 10720* (US). Ciales, Bo. Toro Negro, Rt. 147, km 27.7, *Axelrod & Ackerman 3550* (US). Juana Díaz: Peña de las Cuevas, vicinity of Juana Díaz, *E.G. Britton & Marble 2297* (US). Salinas: Bo. Lapa, E peak, Las Tetas de Cayey, *Proctor & Díaz 42238* (US). Utuado: Cayuco, *Sintenis 6414* (US). Vieques: Cerro Ventana, *Shafer 2869* (US).

Excluded Species

Liogier & Martorell (1982) cite *Tillandsia juncea* (Ruiz & Pav.) Poir. as occurring near Adjuntas, Puerto Rico. However, no specimens have been seen to confirm this record.

Doubtful Species

The name *Tillandsia ramosa* Bello (Anales Soc. Esp. Hist. Nat. 12: 121. 1883) can not be applied with certainty to any taxon in Puerto Rico because the type was destroyed. Its protolog provides a lenghty description which might allow it to be associated with a species in Puerto Rico, however, since the name has never been in used, it would be peferable to propose it for rejection.

9. VRIESEA

Vriesea Lindl., Edward's Bot. Reg. 29: 1843 ["*Vriesia*"], *nom. et orth. conserv.*

Acaulescent usually epiphytic herbs. Leaves in a rosette, polystichous, entire; blades predominantly ligulate and inconspicuously lepidote; leaf scales centrally symmetric. Scape usually conspicuous. Inflorescence various, usually of distichous-flowered spikes, rarely of one or more polystichous-flowered spikes, the distichous flowers becoming secund in many species; bracts generally conspicuous. Flowers bisexual, mostly short-pedicellate; sepals convolute, free, or nearly so, symmetric or subsymmetric; petals free or connate into a tube, much shorter than the sepals, with 2 ligulate appendages at the base, firm and erect or soon flaccid and drooping; stamens included or exserted; ovary superior, or nearly so; stigma lobulate, papillose; ovules many, usually caudate. Fruit capsular. Seeds fusiform with a basal coma and an apical awn. A genus of ca. 193 species from tropical and subtropical South America and the West Indies. Named in honor of Dutch botanist and physician Willem Hendrick de Vriese (1806-1862), of Leyden, The Netherlands.

TYPE: *Vriesea psittacina* (Hook.) Lindl. (≡ *Tillandsia psittacina* Hook.).

1. **Vriesea macrostachya** (Bello) Mez in C. de Candolle, Monogr. Phan. 9: 601. 1896; *Caraguata macrostachya* Bello, Anales Soc. Esp. Hist. Nat. 12: 122. 1883; *Neovriesea macrostachya* (Bello) Britton in Britton & P. Wilson, Bot. Porto Rico 5: 142. 1923. Neotype: Puerto Rico; Orocovis. *Axelrod 6935*, (US; isoneotypes, B, MARY, NY, SEL, UPRRP), designated by J.R. Grant, Nordic J. Bot. 17(2): 158. 1997.

Large, epiphytic or sometimes terrestrial or lithophytic herb. Leaves several, fascicled, rosulate, entire, mostly erect, 50-100 cm long, glabrous above, lepidote below; sheaths conspicuous, dark brown; blades linear-attenuate, 5-8 cm wide, rounded to acute, apiculate, concolorous. Scape very stout, erect or slightly curved at the base, to 2 m long; sterile bracteoles ovate-elliptic, acute, densely imbricate. Inflorescence simple, erect, distichous, 45-80 cm long, many-flowered, the axis mostly over 1 cm thick; bracts ovate, navicular, 3-6 cm long, coriaceous, acute or obtuse, yellowish. Flowers spreading, not secund, nocturnal; pedicels stout, 1-1.5 cm long; sepals imbricate, coriaceous, ovate-elliptic or obovate, obtuse, 2.5-4.6 × ca. 1.5 cm; petals imbricate, linear-obovate, obtuse or acute, 4-4.5 × 1.5-2 cm, yellowish white, with a pair of linear appendages at the base; stamens included. Capsule ellipsoid-ovoid, pointed, 4-6 cm long; seeds with whitish coma.

General distribution: Cuba, Hispaniola, and Puerto Rico.

Distribution in Puerto Rico: Moist and wet forests, about 500 m and above. Recorded from Adjuntas, Barranquitas, Luquillo, Maricao, Naguabo, Orocovis, Ponce, Río Grande, San Germán, Salinas, and Utuado.

Common names: Puerto Rico: *Parásita, Pirigallo.*

Selected specimens examined: PUERTO RICO: Barranquitas: Bo. Barrancas, upper NE slopes of Mt. Torrecilla, *Proctor 42300* (SJ). Maricao: Río Maricao, *N.L. Britton & Cowell 4187* (US). Naguabo: Sierra de Luquillo, Caribbean Natl. Forest, *Proctor 47980* (SJ). Orocovis: Bo. Ala de la Piedra, Toro Negro Forest Reserve, *Axelrod 6935* (US). Río Grande: Sierra de Luquillo, *Sintenis 2792* (US). Utuado: 7 mi N from Adjuntas along road to Arecibo, *Grant & Rundell 93-02294* (US).

10. WERAUHIA

Werauhia J. R. Grant, Trop. Subtrop. Pflanzenwelt 91: 28. 1995.

Epiphytic or terrestrial, acaulescent or caulescent herbs. Leaves numerous, rosulate or in a spiral along the stem, inconspicuously lepidote; sheaths conspicuous to non-differentiated from blades; blades ligulate to linear-triangular, entire. Inflorescence scapose, distichous, simple or compound. Scape bracteoles, primary bracteoles, and floral bracts usually dull, green or brown, or rarely red. Scape bracteoles transitional in form between the leaves and primary bracteoles of inflorescence; bracts conspicuous, fleshy and secund. Flowers bisexual, pedicellate to sessile; sepals free, ecarinate, imbricate, coriaceous; petals free, imbricate in bud, elliptical, with dactyloid appendages at the base, fleshy, dull in color, white, greenish, yellowish or light orange; petal appendages two, dactyloid; stamens shorter than petals, asymmetric; anthers forming a hood over the pistil; ovary superior to inferior; stigma lobes cupulate, without papillae. Fruit a septicidal capsule; seeds numerous, with basal coma. A genus of about 66 species from tropical America and the West Indies. Named in honor of German botanist Dr. Werner Rauh, born in 1913.

TYPE: *Werauhia gladioflora* (H. Wendl.) J. R. Grant (≡ *Tillandsia gladioflora* H. Wendl.).

Key to the species of *Werauhia.*

1. Leaves usually with transverse dark reddish bands; inflorescence simple or laxly branched, with sub-erect , few-flowered secund branches ..... 2. *W. ringens*
1. Leaves never with transverse reddish bands; inflorescence with very short branches, wholly aborted, each subtending a pair of flowers at the apex 2
   2. Sterile bracteoles erect, involute; inflorescence axis about 5-10 (-12) cm long, somewhat dense and congested at the apex; primary fertile bracteoles 3 to 6, 4-6 cm long, the apical ones slightly shorter than the basal ones, sub-erect..... 1. *W. proctorii*
   2. Sterile bracteoles subspreading to spreading, foliaceous; inflorescence axis 15 to 30 cm long, laxly- to densely-flowered; primary fertile bracteoles usually more than 10, 5-15 cm long, the apical ones much shorter than the basal ones, spreading ..... 3. *W. sintenisii*

1. Werauhia proctorii Cedeño-Mald., Harvard Pap. Bot. 4: 115. 1999. Type: Puerto Rico; Sierra de Luquillo. *Proctor 50061*, (holotype: US; isotypes: IJ, JBSD, NY, UPR).

Epiphytic and terrestrial, acaulescent herb. Leaves numerous, densely and polystichously fascicled, forming crateriform rosettes, erect to sub-erect , to 30 cm long but usually shorter, typically red in exposed situations, but sometimes tinged with green especially near the base, or mostly green when in shade, dark brown lepidote-punctulate throughout on both surfaces; sheaths elliptic, mostly wider than the blades; blades linear-attenuate, 2-3 cm at the middle, acute to mostly acuminate. Scape erect, exceeding the leaves, axis yellowish green, glabrous, punctulate, somewhat verrucose above the nodes; sterile

bracteoles erect and involute, exceeding the nodes, elliptic-ovate, acute to short-acuminate, lepidote-punctulate on both surfaces, chartaceous, bright red with yellowish green bases. Inflorescence few-flowered, polystichously branched, mostly dense and congested at the apex of the scape, elliptic-cylindrical in general outline, 6-12 cm long; primary fertile bracteoles like the scape bracteoles, erect to sub-erect , 3.5-6 cm long, equaling or mostly exceeding the flowers; branches almost wholly aborted, punctate-verrucose, subtending a pair of flowers; bracts broadly ovate, obtuse to acute, sometimes bifid, 1.3-1.5 cm × 6-8 mm, infolding the bases of the flowers, lepidote-punctulate on the outside, prominently nerved and punctulate within. Flowers erect; pedicels stout, 3-5 mm long, punctulate-verrucose; sepals oblanceolate-spatulate to oblong, obtuse, 1.8-2.5 cm × 4-6 mm, punctate, rigid-coriaceous, sometimes bifid; petals ligulate, sub-elliptic, acute to obtuse, 2.6-3 cm long, yellow; stamens included. Capsule ellipsoid-cylindrical, short pointed at apex, 3-3.5 cm long.

General distribution: Endemic to Puerto Rico.

Distribution in Puerto Rico: Wet montane forest to cloud forest above 900 m. Recorded from Cayey, Jayuya, Naguabo, Río Grande, and San Lorenzo.

Selected specimens examined: PUERTO RICO: Cayey: Sierra de Cayey, Carite Forest Reserve, *Proctor et al. 47101* (US). Jayuya: Cordillera Central, Toro Negro State Forest, *Proctor & Rivera 47079* (US). Naguabo: Sierra de Luquillo, Caribbean Natl. Forest, Bo. Río Blanco, *Proctor 47980* (US). Río Grande: Caribbean Natl. Forest, Roca el Yunque, *Proctor 42077* (US).

2. Werauhia ringens (Griseb.) J. R. Grant, Trop. Subtrop. Pflanzenwelt 91: 35. 1995; *Tillandsia ringens* Griseb., Cat. Pl. Cub. 255. 1866; *Vriesea ringens* (Griseb.) Harms, Notizbl. Bot. Gart. Berlin-Dahlem 10: 801. 1829. Type: Cuba; Oriente. *Wright 1518*, in part (holotype: GOET; isotypes: GH, MO).
Vriesea guadalupensis sensu Bold., Fl. Dutch W. Ind. Is. 34. 1909, non (Baker) Mez

Epiphytic or occasionally lithophytic herb, variable in size. Leaves numerous, ascending, to 32 (-90) cm long, punctate-lepidote beneath; sheaths ovate-elliptic, mostly indistinct; blades linear-attenuate, acute or acuminate, 3-6 cm wide, usually reddish green, red-banded. Scape erect, stout; sterile bracteoles erect, densely imbricate, sheathing, elliptic-lanceolate, acute to acuminate, pale green or tinged with purple. Inflorescence erect, simple or less often laxly branched, to 50 cm long; primary fertile bracteoles like the scape bracteoles but thinner, much shorter than the axillary branches; branches sub-erect , with dense to open, secund, few-flowered clusters, bearing several imbricate sterile bracteoles at the base; rachis usually slender, verrucose just below the nodes; bracts broadly ovate, acute-acuminate, 3-6.5 cm long, infolding the flowers, exceeding the sepals (at least in lower flowers), straight, carinate toward apex, green or brownish. Flowers erect, to 8 cm long, glabrous; sepals elliptic, acuminate, 2.5-3.5 cm long, subcoriaceous, lustrous; petals white, yellow or greenish, sometimes finely red-tinged, recurved. Capsule to 4 × 1 cm, ellipsoid-cylindrical, apiculate; seeds with entire, minute coma.

General distribution: Costa Rica, Panama, Jamaica, Hispaniola, Puerto Rico, Lesser Antilles and Trinidad.

Distribution in Puerto Rico: Wet mountain forest, ca. 500-700 m. Known from three specimens collected in the Luquillo Mts.

Note: This is a very rare species in Puerto Rico that has only been vouchered with three specimens from the Sierra de Luquillo. Although undoubtedly identifiable, the specimens are relatively depauperate. The description provided is mostly based on Smith and Downs (1977), and Howard (1979).

Selected specimens examined: PUERTO RICO: Luquillo: Río Mameyes, in the Luquillo forests in the mountains, *Roehrs s.n.* (US); Luquillo Mts., *Woodbury s.n.* (UPRRP). Río Grande: El Verde, *Woodbury s. n.* (UPRRP).

3. Werauhia sintenisii (Baker) J. R. Grant, Trop. Subtrop. Pflanzenwelt 91: 48. 1995; *Caraguata sintenisii* Baker, Handb. Bromel. 145, 1889; as ["sintenesii"]; *Guzmania sintenisii* (Baker) Mez in C. de Candolle, Monogr. Phan., 9: 920. 1896; *Thecophyllum sintenisii* (Baker) Mez, Bull. Herb. Boissier, Ser. 2, 3: 131. 1903; *Vriesea sintenisii* (Baker) L. B. Sm. & Pittendr., J. Wash. Acad. Sci. 43: 403. 1953.

Type: Puerto Rico; Sierra de Luquillo. *Sintenis 1589* (holotype: K, US-fragment).

Fig. 65. E

Epiphytic or sometimes terrestrial, acaulescent herb. Leaves numerous forming a dense crateriform rosette, erect or sub-erect , mostly ca. 30 cm long, but sometimes up to 56 cm long, chartaceous, green, reddish or dark red; sheaths elliptic-ovate, from very distinct to slightly wider than the blade, densely punctate-lepidote; blades linear-attenuate, acute or obtuse, apiculate, ca. 2-4 cm wide, flat, glabrous above, very obscurely punctulate-lepidote beneath. Scape erect or ascending, slender, ca. 5 mm thick, glabrous; sterile bracteoles erect, sheathing, imbricate, subfoliaceous, exceeding the internodes, deep red, the upper ones sometimes subspreading. Inflorescence erect, exceeding the leaves, polystichously branched, laxly- to densely-flowered, 15-30 cm long; primary fertile bracteoles sub-erect to mostly spreading, elliptic-ovate, acute or acuminate, exceeding the flowers, deep red; branches almost wholly aborted, each subtending a pair of flowers; bracts ovate to broadly ovate or almost suborbicular, acute or obtuse, 8-15 mm long, punctulate, infolding the bases of the flowers. Flowers subsessile or with pedicels to ca. 5 mm long; sepals elliptic-oblong, acute to mostly obtuse, 1.5-2.5 cm long, coriaceous, glabrous; petals yellowish, linear, obtuse, 3 cm long; stamens included. Capsule ellipsoid-subcylindric, pointed, ca. 3 cm long.

General distribution: Greater Antilles.

Distribution in Puerto Rico: Moist, wet montane and cloud forests above 700 m. Recorded from Adjuntas, Barranquitas, Cayey, Ceiba, Jayuya, Las Piedras, Maricao, Naguabo, Patillas, Ponce, Río Grande, and Utuado.

Selected specimens examined: PUERTO RICO: Adjuntas: Arroyo de los Corchos, between Adjuntas and Jayuya, *N.L. Britton & Cowell 5292* (US). Barranquitas: Bo. Barrancas, Upper NE slopes of Monte Torrecilla, *Proctor & Concepción 42300* (US). Jayuya: Toro Negro State Forest, upper W summit of ridge of Cerro de Punta, *Proctor & Rivera 47080* (US). Las Piedras: El Toro, Agric. Exp. Station, *Woodbury s.n.* (US). Maricao: Buena Vista Camp, Maricao Insular Forest, *Schubert et al. 481* (US). Patillas: Carite Forest Reserve, *Axelrod & Weisel 11129* (US). Río Grande: Luquillo Mountains, Caribbean National Forest, El Yunque area, *Acevedo-Rdgz. 10518* (US).

Cultivated Species

Billbergia pyramidalis (Sims) Lindl. is grown as an ornamental in Puerto Rico. Although listed in Liogier and Martorell (1982), there are no records of this species indicating its naturalized status in Puerto Rico. *Dyckia sulphurea* K. Koch was noted by Britton & P. Wilson (1923) as cultivated and established in St. Thomas. Several species of *Neoregelia* are cultivated extensively as ornamentals in Puerto Rico. *Neoregelia carolinae* (Beer) L. B. Sm. and *N. marmorata* (Baker) L. B. Sm., both native to Brazil, were collected by Proctor (*43730*-SJ and *43729*-SJ respectively) as naturalized. However, further visits to the site show that the species did not persist.

Family 30. **XYRIDACEAE** *Yellow-eyed grass Family*

Xyridaceae C. Agardh, Aphor. Bot. 158. 1823, *nom. conserv.*

by G. R. Proctor & M. T. Strong

Annual or perennial, more or less rosulate, scapose terrestrial herbs of marshy or hydric soils; rhizomes absent but base of plant often somewhat hard or bulbous. Culms terete, ribbed, smooth, or sometimes wing-margined. Leaves basal or several lower cauline, tufted or closely alternate and distichous or equitant, the blades linear and flat to terete-filiform, sheathing at base, glabrous or minutely pubescent. Inflorescence usually terminal on a naked culm, consisting of a compact, bracteate, cone-like spike, the imbricate bracts spirally arranged. Flowers bisexual, zygomorphic, solitary in the axils of the bracts. Calyx of 3 sepals, the outer two chaffy, boat-like, and persistent, the inner one membranous and

covering the flower in bud. Corolla ephemeral, of 3 subequal clawed petals, the outer expanded portion usually yellow (rarely white), the claws concealed by the bracts. Stamens 3, adnate to the petals by their filament bases, the anthers divided into 2 thecae by a broad connective; staminodes 3, alternating with the petals, long-stalked, bifid at apex. Ovary superior, 1-locular to incompletely 3-locular, the placentation marginal or parietal, style terminal, hollow, 3-branched towards the apex; stigmas 3, glandular-hairy. Fruit a capsule with valvate or irregular dehiscence; seeds usually numerous, small, striate or striate-reticulate, ovoid, ellipsoid, or fusiform. A pantropical to warm-temperate family of 4 genera and nearly 300 species. Only the genus *Xyris* occurs in Puerto Rico. There is no modern monographic treatment of the family, only a few regional surveys and inclusion in local or regional floristic studies.

TYPE: *Xyris* L.

Reference: Kral, R. 1966. *Xyris* (Xyridaceae) of the continental United States and Canada. Sida 2 (3): 177-260.

1. XYRIS

Xyris L., Sp. Pl. 42. 1753.

Characters as given for the family, but does not include special features that apply to genera other than *Xyris*. A genus of about 275 species with its center of distribution in the Americas, particularly tropical and warm temperate regions. United States, southeastern Mexico, Central America, West Indies, South America, Asia, Africa, and South Pacific Islands.

TYPE: *Xyris indica* L.

Key to the species of *Xyris*

1. Leaves narrowly linear to filiform, their bases lustrous deep brown or tan; keel of lateral sepals firm, ragged or ascending-fimbriate toward the apex ..... 2. *X. elliottii*
1. Leaves linear, their bases pale, stramineous, or pinkish; keel of lateral sepals scarious, lacerate. 2
    2. Plant annual; culms solitary or 2-3 together; leaves 10-60 cm long, 5-10 mm wide; mature spikes 7-15 (-25) mm long, obtuse ..... 3. *X. jupicai*
    2. Plant perennial; culms tufted; leaves 1-8 (-12) cm long, 1-4 mm wide; mature spikes 4-7 (-8) mm long, acute ..... 1. *X. curtissii*

1. Xyris curtissii Malme, Ark. Bot. 13: 24. 1913; *Xyris serotina* var. *curtissii* (Malme) Kral, Rhodora 62: 310. 1960; *Xyris difformis* var. *curtissii* (Malme) Kral, Sida 2: 255. 1966; *Xyris neglecta* Small, Bull. Torrey Bot. Club 21: 30. 1894, non Nilsson, 1892.Type: Florida; Duval County. *Curtiss 4136* (holotype: NY).

Caespitose perennial. Culms 7-26 (-30) cm tall, linear-filiform, angulate-terete, not much widened distally, several-ribbed, ribs equally prominent, somewhat scabrous, the sheath at base rich deep red-brown, lustrous. Leaves spreading-ascending in broad fans, 1-8 (-12) cm ×1-4 mm, linear-sword-shaped, dull green, often papillate, margins somewhat scabrous; sheaths reddish or purplish, finely rugulose-papillate. Mature spikes ovoid, 4-7 (-8) mm long; lateral sepals included, slightly curved, 5-7 mm long, the keel brown, scarious, lacerate; petals with obtriangular blades, 4 mm long, unfolding in the morning; staminodes bearded. Seeds translucent, ovoid to ellipsoid, 0.5 mm long, finely lined longitudinally with small papillae.

General distribution: United States (southeastern and gulf coastal plains), Central America (Belize), and Puerto Rico.

Distribution in Puerto Rico: This species is confined to moist white silica sand habitats near sea level along the north side of Puerto Rico from Dorado west to the area of Laguna Tortuguero. Recorded from Dorado, Manatí, Vega Alta, and Vega Baja.

Selected specimens examined: PUERTO RICO: Vega Baja: Algarrobo, Tortuguero Lagoon Natural Reserve, *Vélez-Gavilán et al. 374* (MAPR).

2. Xyris elliottii Chap., Fl. South. U. S. 500. 1860. Type: Florida; Franklin County. *Chapman s. n.* (lectotype: NY; isolectotype: NY), designated by Kral, Sida 2: 224. 1966.

Xyris brevifolia sensu Elliott, Sketch Bot. S. Carolina 1: 52. 1816, non Michaux, 1803.

Perennial (and spreading) by means of pale, fleshy, elongate, lateral buds, often forming tufts with brownish bases. Culms usually 35-60 cm tall or more, often slightly twisted. Leaves 8-35 cm × 1-2 (-2.5) mm, linear to narrowly linear (rarely filiform), flat or slightly twisted, the margins pale and minutely tuberculate toward the base, the apex sharply acute or acuminate, the base abruptly dilated, lustrous, the surfaces above the equitant base green or reddish and smooth. Mature flowering spikes ovoid to broadly ellipsoid, 6-15 mm long, acute at apex, bearing several closely imbricate bracts; fertile bracts 5-6 mm long, obovate, the surfaces pale to dark brown; lateral sepals scarious, included or slightly exserted, the keels ragged or ascending-fimbriate toward the apex; blades of petals obovate, yellow, ca. 5 mm long, opening in the morning. Seeds 0.5-0.6 mm long, ellipsoid, translucent, with ca. 12 distinct straight longitudinal lines.

General distribution: Southeastern United States, Cuba, and Puerto Rico.

Distribution in Puerto Rico: In moist white sands at sea level. Recorded from Dorado, Manatí, and Vega Alta.

Selected specimens examined: PUERTO RICO: Dorado: *Stevenson 854* (US); *Sintenis 6844* (US). Manatí: Laguna Tortuguero, track at E end of mogotes (haystack hills) to S shore of lake, *Axelrod & Sastre 5241* (US). Vega Alta: Bo. Sabana, silica-sand area NE of Regadera, *Proctor 45810* (US).

3. Xyris jupicai Rich., Actes Soc. Hist. Nat. Paris 1: 106. 1792. Type: French Guiana. *LeBlond, s. n.* (holotype: P).

Xyris communis Kunth, Enum. Pl. 4: 12. 1843. Syntypes: French Guiana. *Desfontaines s.n.* (B, destroyed); Venezuela. *Otto s.n.* (B, destroyed).

Xyris caroliniana sensu authors, non Walter, 1788.

Short-lived perennial, solitary or in small tufts, dying after one year or persisting by means of small bulbous offshoots. Culms 20-70 cm tall or more, terete and many ridged toward base, flattened and 1- or 2-edged above. Leaves 10-60 cm × 5-10 mm, linear, ascending, often yellow-green and somewhat lustrous long; sheath of the culm shorter than the principal leaves, somewhat loose toward the oblique apex, their bases usually stramineous, rarely pinkish. Mature spikes ovoid, ellipsoid, or oblong, 7-15 (-25) mm long, with rather many loosely imbricate bracts; fertile bracts obovate to oval, 5-7 mm long, the outer surface pale to dark brown; lateral sepals scarious, included, about the same length as the bracts, linear and slightly curvate, lacerate; petals with yellow cuneate blades ca. 3 mm long, opening in the morning. Seeds broadly ellipsoid, 4-5 mm long, with numerous faint longitudinal lines.

General distribution: Southeastern coastal plain of the United States from New Jersey to Florida and west to Texas, Mexico and Central America, Greater Antilles, Trinidad, and South America.

Distribution in Puerto Rico: Occurs near sea level especially in moist white sand but also in other soils near the north coast of Puerto Rico, and also in wet ditches and open banks in the Luquillo Mountains at 600-1000 m. Recorded from Bayamón, Carolina, Cataño, Manatí, Río Grande, San Juan, Vega Alta, and Vega Baja.

Selected specimens examined: PUERTO RICO: Bayamón: *Sintenis 934* (US). Carolina: Sabana Abajo, vicinity of Carolina, *N.L. Britton & Brown 5717* (US). Cataño: *Heller & Heller 1379* (US). Las Piedras/Río Grande: Caribbean Natl. Forest, trail to El Toro Peak, *Axelrod & Herscoviz 5161* (US). Manatí: Laguna Tortuguero, *N.L. Britton et al. 3842* (US); Bo. Tierras Nuevas Saliente, *Proctor & Díaz 42162* (US); *Proctor & Thomas 43812* (US). Río Grande: El Yunque, *Fosberg 520, 44200, 44201, 44202* (US); *Sargent 520* (US). San Juan: Santurce, *Heller & Heller 586* (US); Martín Peña, *Stevenson 497* (US). Vega Alta: Bo. Sabana, silica-sand area NE of Regadera, *Proctor 45809* (US).

Family 31. **JUNCACEAE** *Rush Family*

Juncaceae Juss., Gen. Pl. 43. 1789, *nom. conserv.*

by P. Lewis

Grass-like herbs (one species woody) with mostly short, erect or horizontal rhizomes. Leaves basal, tufted, linear or filiform, cylindrical or flat, sheathing at the base. Flowers single or in panicles, corymbs, or heads, usually small, bisexual or unisexual and dioecious, actinomorphic. Perianth segments 6 in two series, or rarely 3 segments only, mostly glumaceous. Stamens (male part of flower), 6 or 3, opposite to the perianth-segments; anthers 2-locular, basifixed, opening lengthwise; pollen in groups of 4. Ovary superior, 1-locular or divided by 3 septa or 3-locular; styles 1 or 3; stigmas 3; ovules ascending or parietal. Fruit a loculicidally dehiscent capsule. Seeds sometimes tailed with a small straight central embryo. Eight genera with ca. 300 species, generally distributed but more numerous in temperate and cold regions. One genus, *Juncus* occurs in Puerto Rico.

TYPE: *Juncus* L. Sp Pl. 325. 1753.

Reference: Balslev, H. 1996. Juncaceae, Fl. Neotrop. Monogr. 68: 1-167.

1. JUNCUS

Juncus L., Sp. Pl. 325. 1753.

Annual or perennial, rhizomatous, glabrous herbs. Culms usually erect, rarely procumbent or ascending. Leaves alternate, cataphyllous (i. e., with reduced blades) and/or foliar at the base of the culm; sheaths open, usually conspicuously auriculate at junction with the blade; blades linear, varying in cross section: flat with raised margins and slightly channeled above, canaliculate, round to elliptic, or flattened. Inflorescence compound and often with elongate branches; involucral bracts decreasing in size from the base of the inflorescence upwards, the lowermost one often conspicuously different from the upper ones. Flowers bisexual, sometimes clasped by 2 bracteoles on the pedicel; tepals equal or subequal, lanceolate, entire, persistent, stramineous or dark brown, sometimes light green. Stamens 3 or 6, the filaments filiform or flat, sometimes widened at the base, the anthers linear or oblong, obtuse; style 3-branched, the stigmas filiform, twining, papillose; ovary sessile. Capsule 1-locular, 3-septate or 3-locular; seeds many, ellipsoidal, oblong, or ovoid, smooth, rugose or sometimes with a reticulate pattern, brown, yellowish, or dark brown. Distribution: Cosmopolitan, with ca. 220 species, the center of distribution in north temperate regions.

LECTOTYPE: *Juncus acutus* L., designated by Coville in Britton & A. Brown, Ill. Fl. N. U.S. ed. 2, 1: 465. 1913; Hitchock & M.L. Green, Prop. Brit. Bot. 147. 1930.

1. Juncus tenuis Willd., Sp. Pl. 2: 214. 1799.

Type: United States; "America boreali", collector unknown (lectotype: B-W6888, sheet 1; isolectotypes: B-W6888, sheets 2, 3, and 4, HBG; photo at AAU; fragment: NY), designated by Balslev, Fl. Neotrop. Monogr. 68: 79. 1996.

Fig. 44. A-E

Perennial, caespitose herb, 15-70 cm tall; rhizome densely branched, 1.5-2 mm diam. Culms erect, terete, smooth or longitudinally ridged, 0.8-1.5 mm diam. Cataphylls 0-3 per culm, inconspicuous, to 5 cm long, margin scarious, rudimentary blade acicular, to 15 mm long. Leaves all basal, erect, ⅓ of to equaling the length of the culm; sheaths 1.5-9 cm long, with scarious margins terminating in 2 scarious or cartilaginous auricles: blade linear, flat or terete and canaliculate in cross section, 0.5-1.5 mm wide. Inflorescence terminal on the culm, occupying less than ¼ of the total plant height, compound-cymose, consisting of several unilateral cymes (drepania). Lower inflorescence bract resembling basal leaves, herbaceous, 2-20 cm long, distal ones progressively shorter, ultimate ones scarious, to 5 mm long. Tepals unequal, lanceolate, acute to acuminate, at first green with distinct scarious margin, turning



Fig. 44. A-E. *Juncus tenuis.* **A.** Habit. **B.** Inflorescence branch. **C.** Flower. **D.** Capsule. **E.** Seed. (from *Proctor 50694*).

brown to stramineous, outer tepals 3.5-5 mm long, concave, inner tepals 3-4.5 mm long, flat. Stamens 6, 1.3-1.8 mm long, the anthers linear to oblong, 0.4-0.8 mm long. Capsule ellipsoidal, acute to obtuse, apiculate, 2.5-3.5 × 2-2.5 mm, light brown at maturity, 3-septate; seeds ellipsoidal, apiculate, often curved, 0.4-0.6 × 0.2-0.3 mm, smooth to slightly rugose, yellow-brown.

General distribution: Widespread and common species in North America, introduced in the 19th century to western Europe where it is now widespread and still extending its range. Scattered introductions are found in Hawaii, Japan, the Azores, and New Zealand. In the Neotropical region, this species is found throughout the highlands.

Distribution in Puerto Rico: Occurs in several varieties of which two are found in Puerto Rico while none are found in the Virgin Islands.

Key to the varieties of *Juncus tenuis* in Puerto Rico:

1. Plants not over 60 cm tall; auricles 0.5-1.5 mm long, usually longer than wide; leaf blades flat or channeled, adaxial side with a band of hyaline cells occupying ¾ or more width of blade. ..... *J. tenuis* var. *tenuis* 1a
1. Plants up to 90 cm tall; auricles up to 0.5 mm long, wider than long; leaf blades terete or channeled, when channeled, the central part of the x. s. is thicker than the edges, adaxial side with or without a narrow band of hyaline cells occupying less than ⅓ width of blade ..... *J. tenuis* var. *dichotomus* 1b

1a. Juncus tenuis Willd. var. **tenuis**
(See above for type and general distribution).

Distribution in Puerto Rico: Occurs in open disturbed ground at high elevations (900-1300 m), locally frequent. Recorded from Jayuya, Naguabo, Ponce, Río Grande, and Villalba.

Selected specimens examined: Puerto Rico: Jayuya: Cerro de Maravilla to Cerro de Punta, *Liogier & Martorell 35893* (UPR, US); Cerro de Punta, *Woodbury s.n.* (US); vicinity of Cerro Maravilla, *Liogier et al. 28233* (UPR, US). Naguabo: Caribbean National Forest, near Pico del Este, alongside road, *Axelrod & Wen 9160* (US). Ponce: Toro Negro Forest, *Vivaldi 71-49* (UPR). Río Grande: Sierra de Luquillo, Caribbean Natl. Forest, Summit of El Yunque, *Proctor 45543* (US).

1b. Juncus tenuis var. **dichotomus** (Elliott) A. W. Wood, Class-book Bot. 726. 1861; *Juncus dichotomus* Elliott, Sketch Bot. S. Carolina 1: 406. 1817. Type: United States; South Carolina or Georgia. *Elliott s. n.* (CHARL, not seen, photo at KANU).

General distribution: Eastern North America from Massachusetts to Texas, Mexico, Central America and South America at elevations of up to 2500 m, with a previous solitary outlying record from Jamaica; recorded here from Puerto Rico for the first time.

Distribution in Puerto Rico: Recorded only from Naguabo.

Selected specimens examined: Puerto Rico: Naguabo: Sierra de Luquillo, Caribbean National Forest, vicinity of Pico del Este, ca. 1020 m, *Proctor 47993* (US).

Excluded Species

Liogier & Martorell (1982) cite *Juncus effusus* L. as occurring in the Toro Negro area of Puerto Rico. However, no specimens have been seen to confirm this record nor has it been recently collected there.

Family 32. **CYPERACEAE** *Sedge family*

Cyperaceae Juss., Gen. Pl. 26. 1789, *nom. conserv.*

by M. T. Strong and P. Acevedo-Rodríguez

Perennials with rhizomes or stolons, or annuals, grass-like or rush-like herbs, of aquatic or terrestrial habitats; roots fibrous. Culms (stems) solitary or caespitose, triquetrous to trigonous or obtusely so,

rarely 4- or 5-angled, sometimes terete or flattened, solid or hollow, ribbed or entire, smooth or scabrous, glabrous or sometimes pubescent. Leaves well-developed or reduced to bladeless sheaths, borne at base or both basal and cauline; blades flattened, pleated, folded, inrolled, or cylindrical, linear to lanceolate, glabrous or sometimes pubescent, often antrorsely scabrous on margins and primary veins or occasionally smooth; sheaths closed, the inner band membranous with a concave to convex orifice, or sometimes entirely herbaceous with the summit frequently prolonged as a triangular or tongue-like contraligule; ligule absent or short, sometimes a narrow band of hairs. Inflorescences diverse, typically umbelliform, anthelate, corymbose, spicate, paniculate, racemose, or capitulate, sessile or branching, bearing 1 to many spikelets or reduced spikes; involucral bracts leaf-like, well-developed or reduced, or the lowest appearing as a continuation of the culm, rarely absent; spikelets 1- to many-flowered, often with 1 to several empty (sterile) scales at base. Flowers (florets) spirally imbricate or distichous, bisexual or unisexual (the plant then monoecious or rarely dioecious), borne singly, each from the axil of a spikelet scale; perianth, when present, of 3 to many, smooth or barbed, hypogynous bristles or scaly segments, usually persistent at base of mature achene; stamens 1-3, the anthers elliptic to linear, basifixed, bilocular, with theca parallel, longitudinally dehiscent, apiculate or appendaged at apex; ovary 2- or 3-carpellate, unilocular, the style 2- or 3-branched, the unbranched portion capillary, flattened and strap-like, or sometimes 3-angled. Fruit an achene, trigonous (sometimes dorsally compressed), biconvex, globose, cylindrical, ellipsoid, or obovoid, usually apiculate at apex, smooth, reticulate, puncticulate, papillose, verrucose, or transversely rugulose, the style-base deciduous or persistent at apex. A large cosmopolitan family of approximately 3,500 species in 114 genera. As an aid to using the keys and descriptions, features of the Cyperaceae and their terminology are given in Fig. 45.

TYPE: *Cyperus* L.

References: Adams, C. D. 1992. Cyperaceae. Fl. Trinidad and Tobago 3(5): 383-561. Clarke, C. B. 1900. Cyperaceae. *In:* I. Urban, Symb. Antill. 2: 8-169. González-Más, A. 1964. Cyperaceae of Puerto Rico. Ph.D. dissertation, Louisiana State University, Baton Rouge. Kearns, D.M., Wm. W. Thomas, G.C. Tucker, R. Kral, K. Camelbeke, D.A. Simpson, A.A. Reznicek, M. Socorro González-Elizondo, M.T. Strong, and P. Goetghebeur. 1998. Cyperaceae. Pp. 486-663. *In:* J. A. Steyermark, P.E. Berry, & B. Holst (eds.). Flora of the Venezuelan Guayana. Missouri Bot. Gard. Press, St. Louis, Missouri. Steudel, E.G. 1855. Synopsis Plantarum Cyperacearum. J. B. Metzler, Stuttgart, Germany. 348 pp. Strong, M.T. 1996. Cyperaceae. Pp. 478-492. *In*: P. Acevedo-Rdgz., Flora of St. John, U.S. Virgin Islands, Mem. New York Bot. Gard. 78. Tucker, G. C. 1987. The genera of Cyperaceae in the southeastern United States. J. Arnold Arbor. 68: 361-445.

Key to the genera

1. Inflorescence contracted without evident lateral branches or rays, unispiculate (a solitary spikelet at the summit of the culm) or a terminal or pseudolateral, solitary, glomerate or hemispherical capitate cluster of 2-many spikes or spikelets at the apex of the culm. 2
   2. Spikelets laterally compressed or subcompressed; scales distinctly distichous, at least towards base of spikelet. 3
      3. Elongate leaf blades and involucral bracts wanting, the summit of the leaf sheaths merely apiculate or entire; inflorescence unispiculate; achene usually bearing persistent bristles at base..... 6. *Eleocharis*
      3. Elongate leaf blades and/or involucral bracts present; inflorescence multispiculate or unispiculate; achene without bristles at base. 4
         4. Lowest involucral bract shorter than the subtending inflorescence; unbranched portion of style fimbriate towards apex, expanded at base; spikelets 1 (-2); achene coarsely papillate ..... 1. *Abildgaardia*
         4. Lowest involucral bract longer than the subtending inflorescence; unbranched portion of style smooth, not expanded at base; spikelets 2-many; achene finely papillose, punctate, puncticulate, reticulate, or smooth. 5

5. Spikelets 1- to 2-flowered; rachilla short; scales conduplicate, conspicuously keeled ..... 9. *Kyllinga*
5. Spikelets 2- to many-flowered; rachilla elongate; scales navicular..... 5. *Cyperus*
2. Spikelets rounded in cross section; scales or bracts spirally imbricate. 6
6. Leaf blades and involucral bracts wanting; inflorescence unispiculate..... 6. *Eleocharis*
6. Leaf blades and/or involucral bracts well-developed; involucral bracts present; inflorescence multispiculate or unispiculate. 7
7. Summit of leaf sheath long-pilose; inflorescence unispiculate..... 2. *Bulbostylis*
7. Summit of leaf sheath glabrous, or at most short-pubescent; inflorescence a cluster of 2-many spikes or spikelets. 8
8. Culm leafy from base to apex, the sheaths closely overlapping; leaf blades stiff and strongly recurved; plants strictly of coastal beaches and dunes. 13. *Remirea*
8. Culm leafy only at base or lower cauline, or the leaves reduced to bladeless sheaths; plants of diverse habitats, not strictly of coastal beaches and dunes..... 9
9. Inflorescence a terminal, sessile head of 3-several, well-developed spikelets subtended by foliaceous involucral bracts which are whitened basally in several species; achenes biconvex, transversely rugose or rugulose, bearing the persistent base of the style at apex .....14. *Rhynchospora*
9. Inflorescence a pseudolateral head of spikelets or small spikes, overtopped by a single, erect involucral bract appearing as a continuation of the culm; achenes plano-convex or subterete, smooth or minutely papillate or punctate, merely apiculate or short-beaked, not bearing the persistent base of the style at apex. 10
10. Spikelets reduced, 1-flowered, each subtended and hidden by an outer herbaceous, obovate to spatulate, scale-like bract; spikelet scales 1-2 (often wanting), hyaline or membranous; achenes terete or subterete, ellipsoid, ellipsoid-obovoid, or narrowly subcylindrical, merely apiculate at apex, minutely papillate or punctate; bristles at base of achene wanting..... 11. *Lipocarpha*
10. Spikelets well-developed, many-flowered, the capitula of spikelets subtended by an elongate bract appearing as a continuation of the culm; spikelet scales numerous, ovate, herbaceous; achenes plano-convex, smooth, short-beaked at apex; bristles 1-6, down-curved or retrorsely barbed, persistent at base..... 15. *Schoenoplectus*
1. Inflorescence open with evident lateral branches or rays, terminal or with 2-several lateral partial inflorescences from the upper leaf-like bracts, umbelliform, corymbose, paniculate, or racemose, rarely interruptedly fasciculate-spicate, the 2-many spikelets solitary or in fascicles, digitate or glomerate clusters, or spikes at branch or ray tips..... 11
11. Summit of leaf sheath long-pilose; style base persistent as a bulbous tubercle at the apex of the achene ..... 2. *Bulbostylis*
11. Summit of leaf sheath glabrous or at most short-pubescent; style base, if persistent at apex of achene, triangular or conical, not bulbous. 12
12. Achenes globose or globose-trigonous with white bony or crustaceous pericarp, often smooth and shiny or sometimes verrucose, reticulate, or tuberculate, the base often with a persistent 3-lobed hypogynium .....16. *Scleria*
12. Achenes trigonous or biconvex, or a subterete fructification, with stramineous to dark brown, reddish brown, or brown-black pericarp, transversely rugulose, puncticulate, papillate, or smooth, the base without a hypogynium, either naked or bearing persistent bristles, bladed-bristles, or minute scales. 13

13. Fruit an achene bearing bladed or both bladed and spinulose bristles at base..... 8. *Fuirena*
13. Fruit an achene or fructification, naked, or bearing (1-) 6 spinulose or smooth bristles or minute ciliolate scales at base..... 14
14. Spikelet scales distinctly distichous ..... 5. *Cyperus*
14. Spikelet scales imbricate or obscurely distichous..... 15
15. Fruit an achene bearing persistent, barbed, spine-like or needle-like bristles at base.. 16
16. Leaves reduced to bladeless sheaths; culms terete, soft, easily compressed, with internal air cavities; inflorescence pseudolateral, the lowest involucral bract erect and appearing like a continuation of the culm; achenes plano-convex..... 15. *Schoenoplectus*
16. Leaves with well-developed blades; culms trigonous or lenticular, rarely terete, firm or hardened, without internal air cavities; inflorescence terminal or a series of partial inflorescences from the upper leaf-like bracts; achenes biconvex or with 3 wing-angles..... 17
17. Culm lenticular in cross section; leaves distichous; leaf blades unifacial, lacking distinct midvein; spikelet scales dark purple-black or black; style 3-branched; achene with 3 wing-angles..... 12. *Machaerina*
17. Culm trigonous or subterete; leaves spirally 3-ranked; leaf blades with distinct midvein; spikelet scales stramineous, brown, or reddish brown; style 2-branched; achene biconvex .....14. *Rhynchospora*
15. Fruit an achene or fructification without persistent bristles at base. 18
18. Fruit a herbaceous prominently veined sac (perigynium), loosely or tightly enclosing an achene, bidentate at its apex..... 3. *Carex*
18. Fruit an achene or fructification, not surrounded by a perigynium, naked or with 3 minute scales at base. 19
19. Fruit a biconvex or sometimes obtusely trigonous achene bearing the persistent style base or merely apiculate or short-beaked at apex, transversely rugose or rugulose, cancellate, or warty..... 20
20. Unbranched portion of style often flattened and fimbriate or slender and papillate distally; style base disarticulating from the apiculate or short-beaked achene apex; achene surface often cancellate or warty, usually of vertical rows of isodiametric to horizontally rectangular cells..... 7. *Fimbristylis*
20. Unbranched portion of style slender and smooth, expanded at base; style base persistent at apex of achene, triangular, triangular-lanceolate, or discoid; achene surface transversely rugose or rugulose.. 14. *Rhynchospora*
19. Fruit a terete or subterete drupe-like achene or bottle-shaped fructification, conical or acuminate at apex, smooth, longitudinally wrinkled, or minutely rugulose-papillate. 21
21. Culms rounded-trigonous to terete proximally; ventral apex of sheath with a deeply U-shaped orifice; fruit an achene, drupe-like, ovoid-globose, acuminate at apex, longitudinally wrinkled when dry, minutely granular, naked at base ..... 4. *Cladium*
21. Culms subtriquetrous to trigonous proximally; ventral apex of sheath with a stiff, rounded-deltate contraligule; fruit a fructification, bottle-shaped, terete or obscurely trigonous, conical at apex with a truncate tip, smooth, minutely rugulose-papillate, with a dark brown patch on each side, often trisulcate on margins, with 3, minute, rounded-obdeltate, ciliate or sparsely ciliate, sometimes shortly bristle-tipped, reddish scales basally ..... 10. *Lagenocarpus*

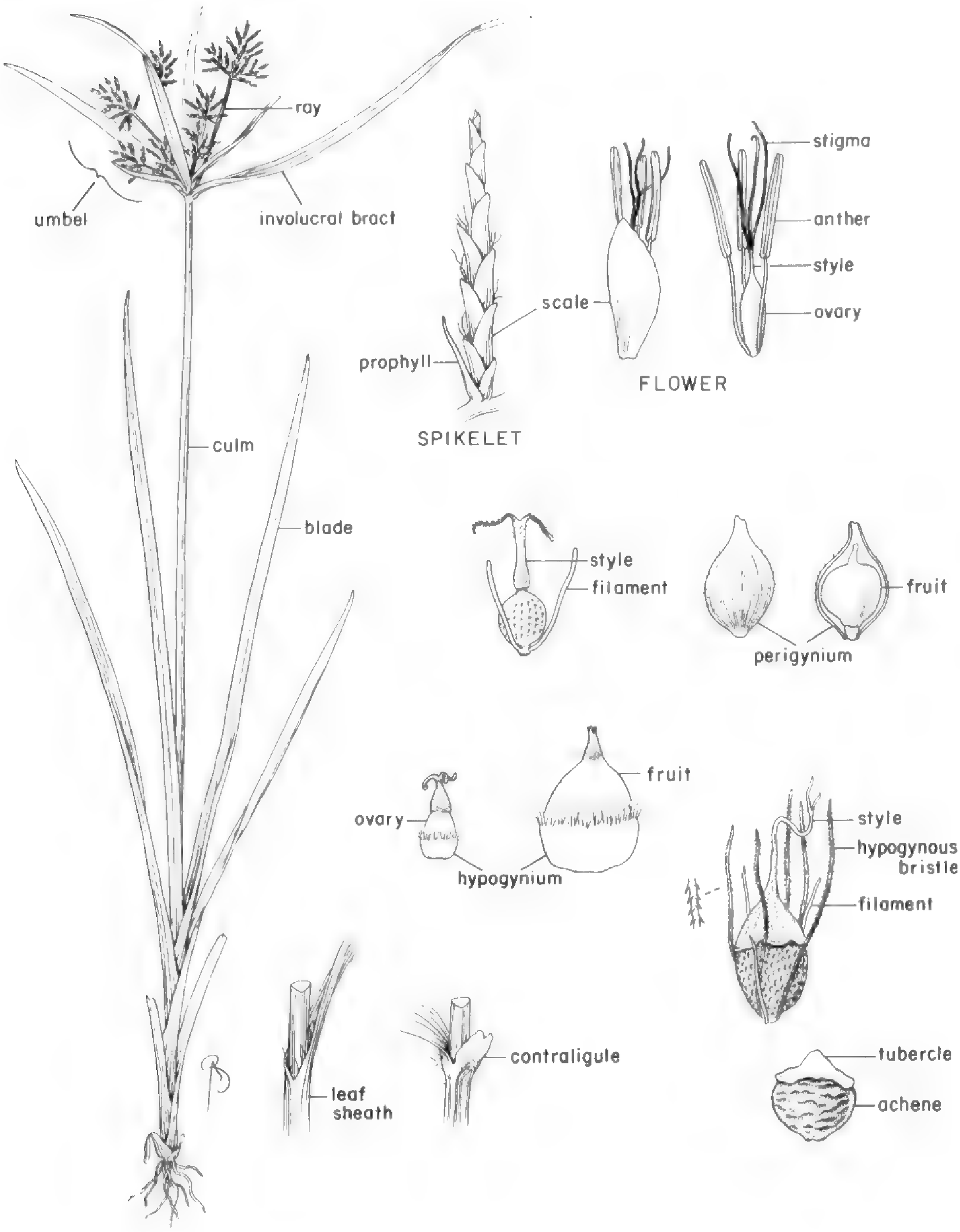


Fig. 45. CYPERACEAE. Terminology used in description of Cyperaceae. From Mori, S. et al. 1997. Vascular plants of central French Guiana. Mem. NYBG Vol. 76(1).

1. ABILDGAARDIA

Abildgaardia Vahl, Enum. Pl. 2: 296. 1805.

Caespitose perennials or annuals. Culms erect or ascending to deflexed, trigonous, obscurely angled, or subterete, ribbed. Leaves basal, blade bearing or reduced to bladeless sheaths; blade-bearing sheaths closed, the inner band membranous, splitting with age, lacking cilia or fimbriae at orifice; ligule absent; blades narrowly linear to filiform, thickened, flattened to involute, antrorsely scabrous on margins. Inflorescence a single spikelet or cluster of several spikelets at the summit of the culm, or a simple anthela, subtended by a single involucral bract which rarely exceeds the inflorescence; spikelets ovate or linear, subcompressed or spirally twisted, many-flowered, the lower 1-2 scales sterile; scales loosely imbricate, distichous or subdistichous, at least towards the base, dorsally keeled, smooth, carina 3- to 5-nerved. Flowers bisexual, or sometimes staminate only in terminal scales of spikelet; hypogynous squamellae or bristles absent; stamens 2 or 3, the anthers narrowly oblong; style 3-branched, the unbranched portion narrowly wing-angled, smooth or glandular-puberulent at junction with the angled, glandular-hairy stigma branches, smooth or remotely fimbriate on margins below, expanded at base, disarticulating from the apiculate achene apex. Achene subglobose to obovoid, obscurely trigonous with convex faces, strongly tricostate, abruptly narrowed at apex to a pyramidal or truncate-pyramidal apiculum, short-stipitate at base, the surface verrucose or coarsely papillate with large, low, dome-shaped papillae. Approximately 15 species in the New and Old World tropics.

LECTOTYPE: *Abildgaardia monostachyos* (L.) Vahl (≡ *Cyperus monostachyos* L.), designated by Svenson, N. Amer. Fl. 18: 556. 1957.

References: Kral, R. 1971. A treatment of *Abildgaardia, Bulbostylis,* and *Fimbristylis* (Cyperaceae) for North America. Sida 4: 57-227. Kral, R. & M.T. Strong. 1999. Eight novelties in *Abildgaardia* and *Bulbostylis* (Cyperaceae) from South America. Sida 18(3): 837-859.

1. Abildgaardia ovata (Burm.f.) Kral, Sida 4: 72. 1971; *Carex ovata* Burm.f., Fl. Ind. 194. 1768; *Fimbristylis ovata* (Burm.f.) J. Kern, Blumea 15: 126. 1967. Type: Java. Collector unknown (holotype: G).

Cyperus monostachyos L., Mant. Pl. 180. 1771; *Abildgaardia monostachyos* (L.) Vahl, Enum. Pl. 2: 296. 1805; *Fimbristylis monostachyos* (L.) Hassk., Pl. Jav. Rar. 61.1848; *Iria monostachyos* (L.) Kuntze, Revis. Gen. Pl. 2: 751. 1891. Lectotype: India. *Koenig s.n.* (LINN-70.3), designated by Gordon-Gray, J. S. African Bot. 32 : 144. 1966.

Cyperus caribaeus Pers., Syn. Pl. 1: 65. 1805. Type: West Indies. Collector unknown (holotype: probably at L).

Fig. 46. A-D

Caespitose perennial, (5-) 10-35 (-50) cm tall; rhizomes short, knotty. Culms obtusely trigonous to subterete, 0.4-0.8 mm wide, 6-10-ribbed, glabrous, light green to stramineous, smooth or antrorsely scabrous on angles just below subflattened apex. Leaves several; sheaths glabrous, prominently veined abaxially, the ventral band membranous, open at summit, prolonged on either side into an auricle; blades 3-30 cm × 0.3-1.1 mm, flattened to broadly U-shaped or involute, prominently veined on abaxial surface, essentially smooth adaxially, light green to stramineous, glabrous, smooth to antrorsely scabrous on margins, at least distally, abruptly acuminate to an often slightly curved tip. Inflorescence of 1(-2) spikelets at the summit of the culm, ascending, subtended by a single involucral bract; rays when present, short, ribbed; spikelets ovate, 6-14 × 3.3-6 mm, acute to acuminate, broadly acute to sub-rounded at base; scales ovate, 4-6 mm long, ca. as broad as long, thickly herbaceous, curvate-carinate, glabrous, light green to stramineous, carina faintly 5-nerved, greenish, prolonged beyond the acute apex as a stiff mucro. Stamens 3, the anthers 1.5-2.5 mm long, apiculate; style branches minutely fimbriate-scaly. Achene obscurely trigonous with convex sides, obovoid, 2-3 × 1.5-2 mm, rounded to truncate at apex, apiculate, abruptly attenuate at base, stipitate, verrucose-tuberculate, stramineous to bone-white.

General distribution: Pantropical.

Distribution in Puerto Rico and the Virgin Islands: In coastal and inland, often successional habitats; sea cliffs, ledges, rocky slopes, scrub

forest and thickets, grassy slopes and clearings, lake shores and margins, open trails, pastures, savannas, lawns, and disturbed areas. Aguas Buenas, Arecibo, Bayamón, Cabo Rojo, Cataño, Ceiba, Dorado, Fajardo, Guajataca, Isabela, Manatí, Mayagüez, Quebradillas, Rincón, Río Grande, Sabana Grande, San Juan, San Sebastián, Trujillo Alto, Vega Alta, Vega Baja, and Yauco; Anegada, St. Croix, and St. John.

Selected specimens examined: PUERTO RICO: Aguas Buenas: *Proctor 43297* (US). Bayamón: *Sintenis 1210* (US). Cabo Rojo: *González-Más 1765* (US). Cataño: Bo. Palmas, *Axelrod & Díaz 12618* (UPRRP). Fajardo: Bo. Cabezas de San Juan, *Axelrod 7154* (US). Guajataca: Guajataca State Forest, *Liogier 9937*(US). Manatí: *Sintenis 6615* (US). Sabana Grande, *Sargent 679* (US). San Juan: Río Piedras, *Stevenson 5655* (US). ST. CROIX: Parasol Hill, *Thompson 438* (US). ST. JOHN: Dittlif Point, *Woodbury 648a/7069* (VINPS).

2. BULBOSTYLIS

Bulbostylis Kunth, Enum. Pl. 2: 205. 1837, *nom. conserv.*

Annuals or perennials, tufted, rarely solitary; culms ascending to deflexed, often wiry, obtusely trigonous to subterete, coarsely ribbed. Leaves basal; sheaths closed at summit, splitting with age, coarsely nerved medially, usually scaberulous, pubescent or glabrous, the orifice oblique or truncate, long-ciliate or fimbriate along margins, rarely glabrous; ligule absent or present; blades capillary, setaceous, or narrowly linear, often canaliculate or crescent-shaped in cross section, antrorsely scabrous or scabrid on margins, strongly nerved abaxially, pubescent or glabrous. Inflorescence a simple or compound umbelliform cyme with elongate rays, a cluster of few to several spikelets at culm tips, or a solitary spikelet; involucral bracts 1-3 (-5), leaf-like, or wanting; rays filiform, ribbed, prophyllate, frequently with intraprophyllar buds; spikelets ovate to oblong-lanceolate, cylindrical or angled, sometimes compressed, many-flowered; scales spirally arranged, rarely somewhat 2-ranked, carinate, curvate-keeled or boat-shaped, dorsally obtuse to acute, pubescent or glabrous. Flowers bisexual; hypogynous squamellae or bristles absent; stamens 1-3, the anthers oblong; styles 3-branched, with minutely papillate or scaly branches, the unbranched portion cylindrical or 3-angled, smooth or rarely ciliate distally, typically disarticulating above the swollen, bulbous base. Achene trigonous to obtusely so, rarely plano-convex, obovoid, or sometimes oblong, with rounded angles, smooth, papillate, reticulate, or transversely rugulose. Approximately 80 species distributed in warm-temperate and tropical regions of the world.

TYPE: *Bulbostylis capillaris* (L.) C. B. Clarke (≡ *Scirpus capillaris* L.), *typ. conserv.*

Reference: Kral, R. 1971. A treatment of *Abildgaardia, Bulbostylis,* and *Fimbristylis* (Cyperaceae) for North America. Sida 4: 57-227.

Key to the species of *Bulbostylis*

1. Inflorescence a single spikelet at the summit of the culm, appearing lateral due to the erect lowest involucral bract which exceeds the spikelet and appears as a continuation of the culm..... 2
   2. Diminutive annual, 2-15 cm tall; spikelets often forming at culm bases; spikelet scales 2-2.6 mm long, stramineous with a pale greenish carina, conspicuously and coarsely reddish dotted and lineolate over entire surface ..... 3. *B. curassavica*
   2. Densely tufted perennial, 7-30 cm tall; spikelets not forming at culm bases; spikelet scales 3-3.5 mm long, light brown with a dark olive-brown carina, finely reddish lineolate on sides ..... 4. *B. pauciflora*
1. Inflorescence with 2-many spikelets and at least some evident branching, terminal, anthelate or corymbose, open or contracted..... 3
   3. Culms and leaves hirsute ..... 7. *B. vestita*
   3. Culms and leaves glabrous, at most antrorsely scabrous on margins. 4
      4. Base of plant bulbous-thickened; spikelets 7-15 × 1.8-2.5 mm; anthers 2-3 mm long ..... 6. *B. subaphylla*

4. Base of plant not bulbous-thickened; spikelets 3-7 × 1-1.8 mm; anthers 0.5-1.2 mm long..... 5
   5. Coarse rhizomatous perennial with knotty rhizome, 47-100 (-135) cm tall; culms 0.8-2.7 (-3) mm wide; achenes somewhat plano-convex, narrowly obovate to oblong, finely lustrous-papillose .....5. *B. stenocarpa*
   5. Slender caespitose perennials, 6-40 cm tall; culms 0.3-0.6 mm wide, achenes obovoid to broadly so, rugulose or finely papillose-rugulose..... 6
      6. Inflorescence open to subdense; carina of spikelet scales distinctly 3-nerved, not thickened, stramineous; achenes broadly obovoid, rugulose-papillose on sides, papillose on angles and at base, brown to often silvery-gray with pale margins at maturity .....2. *B. capillaris* subsp. *insulana*
      6. Inflorescence dense, turbinate to subcapitate; carina of spikelet scales 1-nerved or indistinctly 3-nerved, thickened, whitish, sharply contrasting with the brown-black sides of the scales; achenes narrowly obovoid, finely rugulose-papillose on sides only, light brown to brown at maturity 1.*B.antillana*

1. **Bulbostylis antillana** (Britton) Fernald, Rhodora 40: 392. 1938. *Stenophyllus antillanus* Britton, Bull. Torrey Bot. Club 43: 447. 1916; *Bulbostylis capillaris* subsp. *antillana* (Britton) T. Koyama in R.A. Howard, J. Arnold Arbor. 60: 322. 1979. Type: Dominica; Grand Savanna. *F. E. Lloyd 822* (holotype: NY!).

Slender, densely tufted, short-lived perennial, 9-35 (-40) cm tall; rhizome short, inconspicuous. Culms ascending, wiry, obtusely trigonous, 7- or 8-ribbed, glabrous, smooth proximally, antrorsely scabrous on ribs distally, 0.4-0.6 mm wide. Leaves 3-5 per culm; sheaths glabrous, with cinnamon-colored broad membranous margins, pale brown medially, the orifice oblique, densely ciliate with long crisped whitish trichomes; ligule absent; blades linear-filiform, 3-25 (-30) cm × 0.3-0.5 mm, canaliculate adaxially, substiffened, 5-costate abaxially, essentially smooth to spinulose-ciliate on margins and ribs with tubercle-based hairs, subacute to acuminate at apex. Inflorescence simple, corymbose, with short ascending branches or contracted into a turbinate or narrowly hemispherical aggregate without evident branching, 0.5-1.5 × 0.5-1.7 cm; involucral bracts 1-3, ciliate proximally, the lowermost one elongate, leaf-like, exceeding the inflorescence; corymb branches to 1 cm long or wanting, terminated by small cymules of (1) 2-4 spikelets; spikelets lanceolate or oblong-lanceolate, 3-6(-7) ×1.2-1.5 mm, acute, short-cuneate to sub-rounded at base; scales ovate, straight- to slightly curvate-keeled, dorsally acute, puberulent on sides, reddish brown with brown-black sides distally, margins narrowly scarious, ciliate, carina obscurely 3-nerved, thickened, whitish, sharply contrasting with the brown-black sides of the scale, prolonged beyond the acute apex as a mucro. Stamens 2, the anthers 0.6-0.9 mm long, apiculate. Achene narrowly obovoid or obovoid, trigonous, 0.8-1.1 × 0.6-0.8 mm, truncate and shallowly 3-lobed at apex, short-cuneate to short-attenuate at base, with a finely and closely papillose rugosity, stramineous, pale brown, or often yellowish brown at maturity; style base depressed-globose, 2-3 mm wide.

General distribution: Dominican Republic, Puerto Rico, and the Lesser Antilles.

Distribution in Puerto Rico: On clay or sandy soils on rocky slopes and savannas. Cabo Rojo, Sabana Grande, Vega Baja, and Yabucoa.

Selected specimens examined: PUERTO RICO: Cabo Rojo: *Proctor 44020* (SJ). Sabana Grande: Susúa Forest Reserve, *Delgado Montano & González-Más 53* (MAPR); *González-Más 2035* (MAPR).

2. **Bulbostylis capillaris** subsp. **insulana** M.T. Strong, subsp. nov. Type: Puerto Rico; Bo. Tierras Nuevas Salientes, just S of Laguna Tortuguero, near sea level, 15 May 1977, *Woodbury s.n.* (holotype: SJ; photo at US).

B. capillaris subsp. capillaris spicis ovoid-lanceoloidis vel anguste lanceoloidis, gracilibus; acheniis rugulose-papillosis differt.

Caespitose perennial, 6-40 cm tall; rhizome short, thickened. Culms slender, wiry, trigonous to subterete, 9-ribbed, ribs smooth proximally, antrorsely scabrid distally, 0.3-0.6 mm wide. Leaves 2-3 per culm; sheaths elongate, brown to stramineous, essentially smooth, with broad scarious margins, the orifice oblique, long-fimbriate apically with tawny hairs; ligule absent; blades filiform, 2-12 cm × 0.2-0.5 mm, canaliculate adaxially, coarsely 5-ribbed (including ribbed margins) abaxially, these often smooth or antrorsely scabridulous (at least distally), often spirally twisted distally. Inflorescence a simple to compound, open or contracted anthela, 0.8-3 × 0.4-2 cm; involucral bracts 3-4, shorter than the inflorescence, linear-filiform, with broad membranous bases, ciliate on margins; primary rays filiform to capillary, to 20 mm long; spikelets ovoid-lanceoloid or narrowly lanceoloid, 3-7 × 1-1.7 mm, acute, short-cuneate to sub-rounded at base; fertile scales ovate to broadly lanceolate, 1.4-2.2×1.3-1.8 mm, curvate keeled or only slightly so, dorsally acute, often ciliate on the erose margins, deep brown or red-brown, with black sides distally, puberulent or sometimes glabrous, carina with 3 distinct nerves, equaling or rarely prolonged beyond the obtuse to acute apex. Stamens 3, the anthers 0.5-0.6 mm, long, blunt to apiculate. Achene trigonous, obovoid, 0.9-1.2 × 0.5-0.7 mm, truncate and slightly 3-lobed at apex, attenuated at base, finely transversely rugulose-papillose at maturity, papillose on angles, nearly smooth when immature, brown to often silvery-gray with pale margins at maturity; style base globuliform, 0.2-0.3 mm wide.

General distribution: Cuba, Hispaniola, and Puerto Rico.

Distribution in Puerto Rico: Sandy savannas at Laguna Tortuguero and vicinity. Manatí and Vega Baja.

Note: This taxon differs from the typical subspecies in having slender ovoid-lanceoloid or narrowly lanceoloid spikelets and a rugulose-papillose achene surface vs. ovoid spikelets and transversely rugose achene surface.

Selected specimens examined: PUERTO RICO: Manatí: Bo. Tierras Nuevas Saliente, just S of Laguna Tortuguero, *Woodbury s.n.* (SJ). Vega Baja: Laguna Tortuguero, *Delgado 40, 47,* (MAPR); *105* (MAPR-3, UPR, UPRRP); Bo. Algarrobo, just S of Laguna Tortuguero, *Proctor et al. 47745* (SJ); Laguna Tortuguero, *González-Más & Woodbury 277b* (MAPR); Tortuguero area, *Liogier et al. 33574* (UPR); Laguna Tortuguero, Sep 1960, *Woodbury s.n.* (MAPR, UPRRP); Feb 1962, *Woodbury s.n.* (UPR); Feb 1968, *Woodbury s.n.* (NY); Sep 1969, *Woodbury s.n.* (NY, UPR); Jun 1970, *Woodbury s.n.* (UPR).

3. Bulbostylis curassavica (Britton) Kük. ex Ekman., Ark. Bot. 22A(16): 8. 1929. *Stenophyllus curassavicus* Britton, Bull. Torrey Bot. Club 43: 445. 1916, *nom. et stat. nov.* for *Bulbostylis floccosa* var. β "(?)" *pumilo* C. B. Clarke in Urban, Symb. Antill. 5: 290. 1907; *Fimbristylis curassavica* (Britton) Alain, Bull. Torrey Bot. Club 92: 290. 1965. Type: Curaçao. *Suringar s.n.* (holotype: K).

Bulbostylis curassavica var. *pallescens* Kük. & Ekman ex Urb., Ark. Bot. 22A(17): 6. 1929. Type: Haiti. *Ekman 8749* (lectotype: US; isolectotype: US), here designated.

Diminutive, tufted annual, 2-15 cm tall. Culms ascending to erect, filiform to subcompressed, 5- to 7-ribbed, antrorsely scabrous-hispidulous, 0.3-0.5 mm wide. Leaves 1-3 per culm; sheaths short, sparsely antrorsely scabrous-hispidulous, tan, the orifice truncate, long whitish fimbriate; ligule absent; blades linear-filiform or subflattened, 0.6-8 cm × 0.3-0.5 mm, soft, flexuous, canaliculate adaxially, ribbed abaxially with antrorsely scabrous-hispidulous ribs, acuminate at apex. Inflorescence a solitary, pseudolateral spikelet at the summit of the culm, often with spikelets forming at the base of culm as well; involucral bracts 1-3, the lowermost one erect, appearing as a continuation of the culm; spikelets ovoid to oblong-ovoid, 4-7 × 1.4-2 mm, spreading to 3 mm wide with mature achenes, subcompressed, spirally twisted with distichous scales, acute, cuneate at base; scales ovate, curvate-keeled, dorsally acute, 1.4-2.6 × 1-2 mm, glabrous, stramineous, coarsely reddish dotted and lineolate, margins scarious, ciliate, carina 3-nerved, pale greenish, slightly prolonged beyond and excurved at the acute apex. Stamens 2, the anthers 0.6-0.9 mm long, apiculate. Achene broadly obovoid or sub-rounded, obtusely trigonous, 0.6-0.9 × 0.4-0.6 mm, broadly rounded to subtruncate at apex, obtuse at base, foveate, lustrous, pale brown to reddish brown; style base

depressed-globose, 0.2-0.3 mm wide, brownish black.

General distribution: Haiti, Puerto Rico, Virgin Islands, and Curacao.

Distribution in Puerto Rico and the Virgin Islands: In soil pockets on limestone rocks. Caja de Muertos, Guánica, Maricao, Mona Island, and Yauco; Anegada.

Note: The name (new combination) *Bulbostylis curassavica* (Britton) Kük. ex Ekman was inadvertently validated by an indirect reference to the basionym when the varietal name *Bulbostylis curassavica* (Britton) Kük. var. *pallescens* Kük. & Ekman ex Urb. was listed in an enumeration of plants on Navassa Island by Ekman.

Selected specimens examined: PUERTO RICO: Guánica: San Jacinto Beach, *González Más 990* (US). Yauco: at end of Rt. 333 in Guánica Reserve, *Taylor et al. 9504* (UPRRP).

4. Bulbostylis pauciflora (Liebm.) C. B. Clarke in Urban, Symb. Antill. 5: 290. 1907, *nom. conserv.; Oncostylis pauciflora* Liebm., Kongel. Danske Vidensk. Selsk. Skr. Naturvidensk. Math. Afh., Ser. 5. 2: 241. 1851. Type: St. Croix, U.S. Virgin Islands. *Oersted s.n.* (holotype: C; isotype: NY!).

Stenophyllus portoricensis Britton, Torreya 13: 216. 1913; *Bulbostylis portoricensis* (Britton) Fernald, Rhodora 40: 392. 1938; *Fimbristylis portoricensis* (Britton) Alain, Bull. Torrey Bot. Club 92: 290. 1965. Type: Puerto Rico; Guánica, *Britton & Shafer 1916* (holotype: NY!; isotype: US!).

Bulbostylis ekmanii Kük., Repert. Spec. Nov. Regni Veg. 23: 197. 1926. Lectotype: Cuba; Nipe Bay. *Ekman 7341* (US!), here designated.

Fig. 46. E-H

Densely tufted perennial, 7-30 cm tall; rhizomes short; roots filiform. Culms subtrigonous, wiry, 4- or 5-ribbed, soft, flexuous, reddish or reddish brown, glabrous, antrorsely scabrid on ribs distally, 0.2-0.3 mm wide. Leaves 1-3 per culm; sheaths glabrous, prominently 3-veined abaxially, membranous and finely veined on margins, reddish brown, the orifice oblique, long whitish fimbriate at apex; ligule absent; blades wiry, linear-filiform, 2-16 cm × 0.2-0.3 mm, canaliculate adaxially, prominently 3- to 5-ribbed, abaxially, reddish or chestnut-colored, glabrous, antrorsely scabrid on margins and ribs, at least distally, the apex acuminate. Inflorescence a single, often pseudolateral, spikelet at the summit of the culm; involucral bracts 3, the lowermost with sheathing base and apical fimbriae, elongate, often overtopping the spikelet and appearing as a continuation of the culm, the upper two typically scale-like, shorter than the spikelet; spikelets ovate-lanceolate, subcompressed, 4.5-10 (-12) × 1.3-2 mm, often falcate; scales narrowly-ovate, 2.7-3.5 ×1-2 mm, glabrous, light brown to reddish brown, straight- to slightly curvate-keeled, dorsally acute to obtuse, finely reddish lineolate on sides, carina 3-nerved, dark reddish brown, ending at the acute apex or prolonged and short-mucronate on basal scales of spikelet. Stamens 3, the anthers 1-1.3 mm long, with a triangular prickly apiculum. Achene ellipsoid-obovoid, trigonous, 1.3-1.6 × 0.6-0.9 mm, obtuse at apex and base, transversely rugulose, yellowish brown to brown, the angles often lighter, yellowish; style base depressed-pyramidal, 0.2-0.3 mm wide, sometimes deciduous.

General distribution: Cuba, Hispaniola, Puerto Rico, Virgin Islands, and the Lesser Antilles.

Distribution in Puerto Rico and the Virgin Islands: On limestone or serpentine substrate, often in dry, rocky or sandy areas of scrub forest and thickets along the coast. Cabo Rojo, Guánica, Ponce, Sabana Grande, and Vieques; Anegada, St. Croix, St. John, and St. Thomas.

Selected specimens examined: PUERTO RICO: Cabo Rojo: Morrillos de Cabo Rojo, *N.L. Britton et al. 4710* (US). Ponce: Bo. Cañas, N off Rt. 2 just before prison, *Axelrod & Chávez 7102* (US). Vieques: Punta Este, *Proctor 48570* (US). ST. CROIX: Sandy Point, *Raunkiaer s.n.* (US); *Acevedo-Rdgz. et al. 5304* (US).

5. Bulbostylis stenocarpa Kük., Bot. Jahrb. Syst. 56(Beibl. 125): 15. 1921. Type: Brazil; Amazonas. *Ule 8069* (holotype: B, destroyed; isotypes: K!, US!).

Bulbostylis papillosa Kük., Repert. Spec. Nov. Regni Veg. 23: 198. 1926; *Fimbristylis papillosa* (Kük.) Alain, Bull. Torrey Bot. Club 92: 290. 1965. Lectotype: Cuba. *Ekman 2690* (US!), here designated.

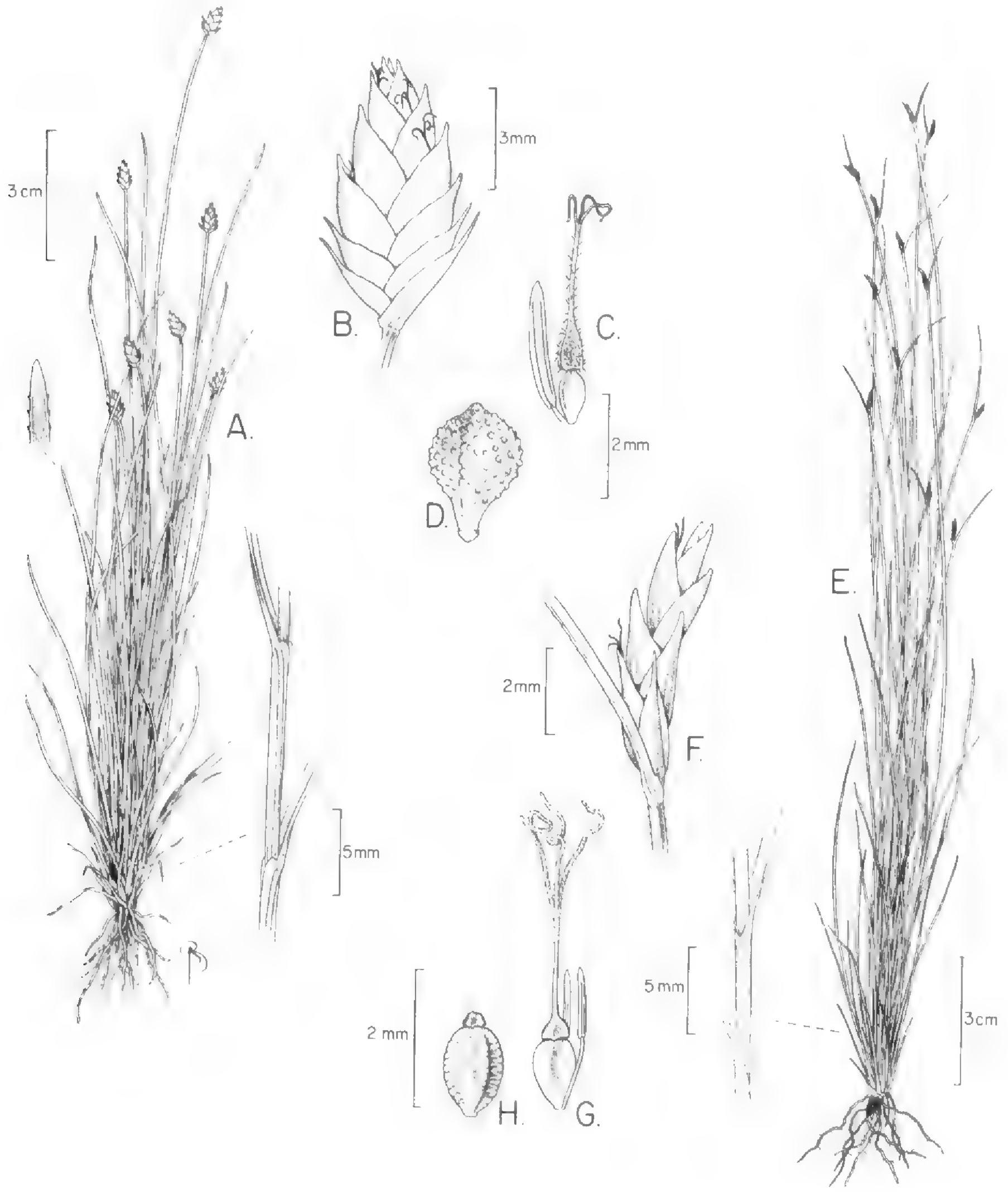


Fig. 46. A-D. *Abildgaardia ovata.* **A.** Habit, detail of leaf blade apex, and detail of culm showing apex of sheaths. **B.** Spikelet. **C.** Flower. **D.** Achene. **E-H.** *Bulbostylis pauciflora.* **E.** Habit, and detail of culm showing apex of sheaths. **F.** Spikelet. **G.** Flower. **H.** Achene. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

Caespitose perennial, 47-100 (-135) cm tall; rhizome short, thickened, knotty. Culms erect, stiff, breaking easily when bent, obtusely trigonous to subterete, low-ribbed, shallowly grooved, essentially smooth, 0.8-2.7 (-3) mm wide. Leaves numerous; sheaths herbaceous, low-ribbed dorsally, sub-scarious and finely veined along reddish margins, scabrid on veins, brownish dorsally, gradually narrowing distally, long-fimbriate with pale fimbriae apically at junction with blade; ligule a short, ciliate, prolongation of the adaxial apex of sheath; blades mostly ascending, 7-77 cm × (0.5-) 0.8-1.8 mm, subflattened or slightly involute, abaxially convex and closely ribbed, smooth or antrorsely scaberulous, margins slightly thickened, adaxial surface smooth, the apex sub abruptly acuminate. Inflorescence a terminal, compound, narrowly to broadly turbinate, often dense and broom-like corymb of densely fascicled spikelets at tips of short, stiff, primary branches, 1.5-8 × 1-5 cm; involucral bracts 2-3, shorter than the

inflorescence or the lowermost one sometimes slightly exceeding it; spikelets lanceoloid, 3.5-5 (-6) × 1-1.3 mm, acute, short-cuneate at base; scales loosely imbricate, ovate, 1.7-2.2 × 1-1.6 mm, strongly curvate-keeled, dorsally acute, scabridulous, dark red-brown to brown-black, carina dark green, obscurely 3-nerved, prolonged beyond the acute apex as a slightly excurved mucro. Stamens 3, the anthers 0.8-1.2 mm long, with a lanceolate apiculum. Achene somewhat plano-convex, oblong-obovate, 1-1.3 × 0.5-0.7 mm, truncate at apex, short-cuneate at base, indistinctly tricostate, often with pale angles, gray-brown at maturity, finely lustrous-papillose; style base bulbiform, 0.1 mm diam.

General distribution: Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico: On grassy slopes and road banks. Aguada and Moca.

Note: Bulbostylis stenocarpa has been included in the synonymy of *B. junciformis* (Kunth) C. B. Clarke by some authors, but its coarser habit, wider leaf blades, and somewhat plano-convex, oblong-obovate, lustrous-papillose achene (vs. obovoid and honeycomb-reticulate achene of *B. junciformis*) is distinct from the latter.

Selected specimens examined: Puerto Rico: Aguada: *Sargent 613* (US).

6. Bulbostylis subaphylla C. B. Clarke in Urban, Symb. Antill. 2: 86. 1900; *Stenophyllus subaphyllus* (C. B. Clarke) Britton, Bull. Dept. Agric. Jamaica 5 (Suppl. 1): 12. 1907. Type: Cuba. *C. Wright 1533* (holotype: K).

Stenophyllus harrisii Britton, Torreya 20: 83. 1920; *Fimbristylis harrisii* (Britton) C.D. Adams, Phytologia 21: 66. 1971. Type: Jamaica; Old England Falls. *Harris 12980* (holotype: NY!; isotype: US!).

Densely caespitose, rhizomatous perennial, 22-60 (-75) cm tall; rhizome short, thickened; Culms erect, obtusely trigonous to subterete or subcompressed, firm but flexuous, many-ribbed, smooth, often antrorsely scabrid on margins near apex, 0.5-0.8 mm wide. Leaves 5-12 per culm, crowded at base; sheaths short, glabrous, pale, reddish brown proximally, wooly-fimbriate at the oblique orifice, with pale crisped hairs; ligule absent or partially ligulate with two dense tufts of hair on adaxial margins at junction of sheath and blade; blades linear-filiform, 4-35 (-53) cm × 0.6-1.2 (-1.5) mm, thickly herbaceous, substiffened, crescent-shaped, subinvolute, or subflattened, 5- to 7-nerved abaxially, antrorsely scabrid on margins, the apex acute to acuminate, often with one margin curving to tip. Inflorescence a simple, open anthela with short branches or contracted with little evident branching, 2-4 × 1-2.5 (-3) cm; involucral bracts 1-3, leaf-like, but reduced, ciliate with crisped hairs on margins of sheathing base; branches, when present, to 2.5 cm long; spikelets borne singly at branch tips, oblong-lanceolate, 7-15 × 1.8-2.5 mm, subcompressed, acute to short acuminate at apex, cuneate at base, often proliferous; scales narrowly ovate, 3-5 × 1.4-2.3 mm, slightly curvate- to straight-keeled, dorsally acute to widely obtuse, sparsely hirtellous to glabrous, reddish brown, margins narrowly scarious, ciliate-fimbriate with crisped hairs, carina 3-nerved, pale green, prolonged beyond the acute apex as a short mucro. Stamens 3, the anthers 1.5-2.7 mm long, bluntly apiculate. Achene obovoid, trigonous, subdorsiventrally-compressed, 1.2-1.5 × 0.8-1.1 mm, rugulose, shiny, pale brown to brown or yellowish brown, often with lighter-colored angles; style base obtusely 3-angled, depressed, minutely 3-lobed above each angle, with a minute central apiculum, 0.3-0.4 mm wide.

General distribution: Cuba, Haiti, Jamaica, and Puerto Rico.

Distribution in Puerto Rico: In dry, rocky areas of scrub forests and thickets. Guánica and Ponce.

Selected specimens examined: Puerto Rico: Guánica: Guánica State Forest, *Proctor & Rivera 47162* (US). Ponce: Bo. Cañas, off Rt. 2, behind the Holiday Inn Hotel, *Axelrod et al. 4724* (US).

7. Bulbostylis vestita (Kunth) C. B. Clarke in Urban, Symb. Antill. 2: 87. 1900; *Isolepis vestita* Kunth, Enum. Pl. 2: 210. 1837; *Oncostylis vestita* (Kunth) Nees in Martius, Fl. Bras. 2(1): 88. 1842; *Scirpus vestitus* (Kunth) Rchb. ex Boeck., Linnaea 36: 753. 1870; *Fimbristylis vestita* (Kunth) Hemsl., Biol. Cent.-Amer., Bot. 3: 460. 1885; *Stenophyllus vestitus* (Kunth) Britton, Bull. Torrey Bot. Club 43: 446. 1916. Type: Surinam. *Weigelt s.n.* (holotype: B, destroyed; isotype: K!).

Scirpus hirtus Griseb., Cat. Pl. Cub. 241. 1866. Type: Cuba. *C. Wright 3383* (holotype: GOET; isotype: GH).

Bulbostylis hirtella sensu Urban, Symb. Antill. 4: 120. 1903, non (Schrader) Nees von Esenbeck, 1843.

Caespitose perennial, (7-) 12-62 cm tall; rhizome short, bearing very dense clumps of culms, seemingly arising from a common point. Culms stiffly ascending to erect, obtusely trigonous to subterete, 8- or 9-ribbed, hirsute, 0.4-0.8 mm wide. Leaves 5-10 or more per culm; sheaths hirsute, brownish with broad, scarious, reddish brown, finely veined margins, fimbriate at the oblique orifice; ligule absent; blades 2-30 cm × 3-5 mm, ascending to spreading, often curling or recurved, filiform or subflattened, convex and 3-5 veined abaxially, spreading-hirsute, canaliculate and glabrous adaxially. Inflorescence a terminal, simple, anthela with short rays bearing small clusters or fascicles of spikelets at ray tips, or sometimes a single lobed cluster of spikelets at the summit of the culm, 4-30 mm in diam.; involucral bracts 2-4, leaf-like but reduced, shorter than the inflorescence or sometimes the lowermost one exceeding it; spikelets ovoid to ovoid-lanceoloid, 3.4-6 ×1.4-2 mm; scales broadly ovate to sub-rounded, curvate-keeled, dorsally acute, 1.8-2.2 × 2-2.2 mm, rugulose and hirtellous, deep red-brown, carina 3-nerved, or obscurely so, thickened, prolonged as a prominent, slightly excurved mucro. Stamens 3, the anthers 0.8-1 mm long, with a triangular apiculum bearing a tuft of crystalline prickles at tip. Achene obovoid, obtusely trigonous with convex faces, 0.7-0.9 × 0.6-0.7 mm, truncate at apex, short-cuneate at base, often lustrous, finely transversely rugulose-papillate to nearly smooth, dark brown or gray brown with pale angles, whitish when immature; style base obtusely trigonous, depressed, with a central apiculum, 0.2-0.3 mm wide.

General distribution: Mexico, Central America, West Indies, Trinidad, and South America

Distribution in Puerto Rico: In dry, red, lateritic soils or sandy soils of clearings, grassy areas, slopes, pastures, and roadsides. Maricao, Mayagüez, Moca, San Sebastián, and Vega Baja.

Selected specimens examined: Puerto Rico: Mayagüez: Cerro Las Mesas, Bo., *Proctor 42186* (US); Las Mesas, *Holm 111* (US). San Sebastián: *Sargent 347* (US). Moca: Rd. 110, km 92, *González-Más 1806* (US).

Excluded species

Bulbostylis junciformis (Kunth) C. B. Clarke, Trans. Linn. Soc. London, Bot. 4: 512. 1895.

Reported by Liogier & Martorell (1982: 212; 2000: 238) for Puerto Rico based on a Woodbury collection from Laguna Tortuguero. No specimens have been seen of this species from the flora area. This name has been misapplied to *B. stenocarpa* Kük. by some authors.

Bulbostylis langsdorffiana (Kunth), C.B.Clarke in Urban, Symb. Antill. 2: 89. 1900.

Cited by C. B. Clarke for Puerto Rico (in Urban, Symb. Antill. 2: 89. 1900), based on a misidentification of *Sintenis 1208* which is *Bulbostylis vestita* (Kunth) C. B. Clarke.

3. CAREX

Carex L., Sp. Pl. 972. 1753, *nom. conserv. prop.*

Grass-like perennial herbs. Tufted or with short or elongate creeping rhizomes, sometimes stoloniferous, monoecious, rarely dioecious. Culms triquetrous or trigonous, rarely subterete, solid or sometimes hollow. Leaves 3-ranked, basal and cauline or primarily basal, the lowermost often bladeless; sheaths finely veined, often with a membranous inner band which is closed at the concave to truncate orifice; ligule often present; blades flat, involute, V-shaped , or folded, narrowly linear, rarely lanceolate or elliptic and subpetiolate, finely veined. Inflorescence a single terminal spike or a terminal and series of 1-several subcontiguous or remote spikes or panicles from the upper leaf-like or scale-like bracts; spikes sessile or peduncled with spirally-arranged perigynia, unisexual, androgynous, or gynecandrous, rarely mixed, inflorescences bearing unisexual spikes often with the 1-several staminate spikes terminal

and pistillate spikes below. Flowers unisexual; hypogynous squamellae or bristles absent; staminate flowers with 3 stamens subtended by a single scale; pistillate flowers a single ovary contained within a tight or inflated, 2-sided, trigonous or rounded, often bottle-shaped perigynium, subtended by a single scale; style 2- or 3-branched, continuous with the ovary and persistent or articulated with it and deciduous, straight or flexuous, often thickened at base, the tips of the stigmas exserted from the apex or often bidentate beak of the perigynium; perigynium membranous, chartaceous, or coriaceous, often ribbed or nerved with raised or impressed nerves, or smooth, sometimes winged, glabrous, pubescent, hispid, papillose, puncticulate, or smooth, sometimes spongy at base, the apex often beaked, bidentate or bifurcate. Fruit an achene, lenticular, biconvex, or trigonous, generally green, puncticulate or sometimes smooth. Approximately 2,000 species, cosmopolitan, widespread in temperate zones and montane tropics.

LECTOTYPE: *Carex hirta* L., *typ. conserv. prop.*

Note: Britton, in "The sedges of Jamaica", Bull. Dept. Agric. Jamaica 5, Suppl. 1. 1907, designated *Carex pulicaris* L. as the lectotype of *Carex*. However, Jarvis (Taxon 41: 559. 1992) has proposed *C. hirta* L. as the lectotype with a conserved type following the proposal of Hitchcock & Green (1929) in International Botanical Congress Cambridge (England), Nomenclature Proposals by British Botanists, London. The spermatophyte committee has accepted this proposal but at this juncture it is still in limbo awaiting decision by the general committee.

References: Kern, J.H. & H.P. Noteboom. 1979. Cyperaceae-II, 28. Carex. Pp. 107-183. *In*: C.G.G.J. van Stennis, ed., Flora Malesiana, Vol. 9, Part 1, Noordhoff International Publishing, Leyden, The Netherlands. Reznicek, A.A. 1993. *Carex* (Cyperaceae). Pp. 243-267. *In*: R. McVaugh, Flora Novo-Galiciana, Vol. 13: Limnocharitaceae to Typhaceae, The University of Michigan Herbarium, Ann Arbor.

Key to the species of *Carex*

1. Inflorescence moniliform with setaceous bracts; perigynia plano-convex, wing-margined, densely disposed in gynecandrous spikes; style 2-branched; achenes biconvex .....1. *C. longii*
1. Inflorescence a series of 3-11 narrowly pyramidal panicles from the upper leaf-like bracts; perigynia trigonous, not wing-margined, laxly disposed in androgynous spikes; style 3-branched; achenes trigonous..... 2. *C. polystachya*

1. Carex longii Mack., Bull. Torrey Bot. Club 49: 373. 1922. Type: United States; New Jersey, Cape May County, *Long s.n.* (holotype: PH).

Caespitose, forming small to medium-sized clumps, (15-) 30-80 (-120) cm tall; rhizome short. Culms erect, slender, 1.3-3 mm wide, trigonous to sharply so, stiff and hardened, smooth proximally, scabrous on angles at apex. Leaves 4-6, lower cauline, the basal ones often bladeless; sheaths elongate, tight, proximal ones pale brown, cauline ones green, the inner band herbaceous, prominently veined, with concave orifice; ligule rounded, 2-6 mm long; blades linear, 6-40 cm × 1.5-4 (-4.5) mm, plicate, glabrous, long-acuminate. Inflorescence moniliform, a series of (2-) 3-10 (-11), subcontiguous, sessile, ellipsoid to obovoid spikes at the summit of the culm, (1.4-) 2.2-6 cm long; inflorescence bracts setaceous, reduced distally; spikes gynecandrous, 6-17 × 4-6 mm, obtuse, the scales appressed-ascending or slightly spreading; pistillate scales ovate, 2.2-3.7 × 1.1-1.8 mm, obtuse to acute, lustrous, silvery white to pale brown, midcosta 3-nerved, green, the midnerve prolonged as a short awn or mucro on proximal scales, ending short of the tip on distal scales. Anthers 1-2.3 mm long; style 2-branched; perigynia plano-convex, broadly obovate or suborbicular, broadest near the middle, 3-4.5 × 1.6-2.8 mm, light silvery green or silvery brown, 3- to 9-nerved adaxially, 5- to 13-nerved abaxially, the margins thinly winged, abruptly contracted into a scabrous-margined, bidentate beak, 0.7-1.3 mm long, with teeth ca. 0.2-0.4 mm long; achenes biconvex, ovate to oblong-ovate, 1.4-1.7 × 0.9-1.1 mm, short-stipitate, pale brown.

General distribution: North America, Mexico, Central America, West Indies and South America;

introduced and naturalized in Hawaii and New Zealand.

Distribution in Puerto Rico: Only recently collected in an open area along roadside of Hwy 184, 902 m, Guayama. Because the center of distribution of *Carex longii* is in the United States and it is not known historically from Puerto Rico, this occurrence likely represents a recent introduction.

Specimens examined: PUERTO RICO: Guayama, Sierra de Cayey, along Hwy 184 E of jct. Hwy 179 at Communication Tower facility, *Worthington 31243* (photo at US, UTEP).

2. Carex polystachya Sw. ex Wahlenb., Kongl. Vetensk. Acad. Nya Handl. 24: 149. 1803; *Carex cladostachya* f. *polystachya* (Sw. ex Wahlenb.) C. B. Clarke ex Lindm., Bih. Kongl. Svenska Vetensk.-Akad. Handl. 26, III(9): 36. 1900. Type: Jamaica. *Swartz s.n.* (holotype: S-Sw. R-925).

Carex cladostachya Wahlenb., Kongl. Vetensk. Acad. Nya Handl. 24: 149. 1803. Type: Jamaica. *Swartz s.n.* (holotype: S-Sw. R-912).

Carex dussiana Boeck., Beitr. Cyper. 2: 42. 1890. Type: Martinique. *Duss 763b* (holotype: B, destroyed).

Fig. 47. A-F

Caespitose, 15-70 (-100) cm tall; rhizome short, woody. Culms erect, slender, trigonous, often channeled along one side distally, smooth, sometimes antrorsely scabrous on margins distally, otherwise glabrous, 0.8-1.8 mm wide. Leaves 5-9 per culm, primarily basal, 1-2 cauline; sheaths tight, elongate, finely veined, green to stramineous or tinged with yellowish brown proximally, the basal sheaths often fibrillose at base, the inner band with concave orifice; ligule a membranous, inverted widely V-shaped band, 0.3-0.5 mm long; blades narrowly linear, 12-60 (-80) cm × (1.2-) 1.5-6 (-8) mm, flattened-plicate, antrorsely scabrous on margins and abaxial midvein, gray-green, attenuate to triquetrous apex. Inflorescence a terminal and series of 3-11 narrowly pyramidal, long-pedunculate partial panicles from the upper 3-4 leaf-like bracts, 1-3 from each node, 1.5-5 × 0.6-1.7 (-2.2) cm; spikes 1-25, androgynous, simple or sometimes compound, ovate to oblong-ovate, 4-16 × 3-5 mm, staminate portion 1.5-6 × 0.6-1.2 mm with 2-12 flowers, pistillate portion 3-10 × 3-5 mm with 6-18 flowers; scales ovate to ovate-lanceolate, narrowly scarious on margins, glabrous to antrorsely scabrous distally, carina 1- to 3-nerved, prolonged beyond the scarious, acute to emarginate apex as a straight to slightly excurved, antrorsely scabrous awn; staminate scales 1.4-3 × 0.9-1.4 mm, pale reddish brown; pistillate scales 0.8-2 × 0.8-1.6 mm (excluding awn), green to stramineous or reddish brown, often red lineolate distally along margins. Perigynia ellipsoid- to obovoid-fusiform, 2.5-4 × 0.7-1.2 mm (including beak), trigonous, with plane to concave sides, spreading, short-stipitate, membranous, distinctly 12- to 15-nerved, green, glabrous to antrorsely scabrous distally, the subulate beak straight to slightly recurved, shallowly to deeply bidentate. Anthers 1-1.7 mm long, with a prickly apiculum; style 3-branched. Achene elliptic, trigonous, with concave sides, 1.5-2.3 × 0.7-1.1 mm, obtuse at apex, short-apiculate, short-attenuate at base, stipitate or subsessile, puncticulate, tightly enveloped by the perigynium, pale brown.

General distribution: Southern Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico: Shaded, wet, montane forest on rocky slopes and roadbanks, cliffs, along trails, thickets, and stream banks from 480-1250 m. Adjuntas, Arecibo, Cayey, Ceiba, Jayuya, Luquillo, Maricao, Naguabo, Orocovis, Ponce, Río Grande, Salinas, and Villalba.

Selected specimens examined: PUERTO RICO: Luquillo: Luquillo Forest, road towards El Yunque Mt., *González-Más 1549* (US). Jayuya: Los Tres Picachos, *Sargent 3063* (US); near Salto Doña Juana, *González-Más 2189* (US). Naguabo: Sierra de Naguabo, Monte El Duque, *Shafer 2254* (US); Loma Icaco, *Shafer 3434* (US). Río Grande: Sierra de Luquillo, *Hioram 365* (US); El Yunque, *McKee 10642* (US). Salinas: Bo. Lapa, summit area of East Peak, Las Tetas de Cayey, *Proctor 43523* (US).

4. CLADIUM

Cladium P. Browne, Civ. Nat. Hist. Jamaica 114. 1756.

Large to medium-sized, often emergent perennials; rhizomes horizontal, scaly, stolons sometimes present below culm bases; roots coarse. Culms leafy, often proliferous at lower nodes. Leaves numerous, basal and cauline; sheaths elongate; ligule absent; blades broadly linear, flattened, coarsely antrorsely serrulate-scabrous on margins. Inflorescence paniculate, consisting of a terminal and series of 1-many lateral partial compound corymbs from the upper leaf-like bracts; branches often elongate, the spikelets in small heads or fascicles at branch tips; spikelets ovoid, with irregularly spirally imbricated scales borne on a flexuose rachilla; scales 6-8, the basal 4-6 sterile, or sometimes staminate, often smaller than the 2 upper fertile bisexual ones, only the terminal floret producing an achene, the lower floret with an abortive pistil. Flowers bisexual; hypogynous squamellae or bristles absent; stamens 2; style 3-branched. Achene ovoid, subterete, smooth, the pericarp thick and corky; bristles absent. As recognized in the strict sense here excluding *Machaerina* and *Baumea*, there are four species in warm-temperate and tropical regions of Europe, Asia, Pacific Islands, North America, Central America, and South America.

TYPE: *Cladium jamaicense* Crantz [as "*iamaicense*"].

1. Cladium jamaicense Crantz, Inst. Rei Herb. 1: 362. 1766; *Schoenus cladium* Sw., Prodr. Veg. Ind. Occ. 19. 1788, *nom. illeg.*; *Mariscus jamaicensis* (Crantz) Britton ex Small, Fl. Miami 31. 1913; *Cladium mariscus* subsp. *jamaicense* (Crantz) Kük., Repert. Spec. Nov. Regni Veg. Beih. 40(1): 523. 1938. Lectotype: Jamaica. *Browne s.n.* (LINN-68.2), designated by McVaugh, Fl. Novo-Galiciana 13: 268. 1993.

Cladium occidentale sensu Grisebach, Fl. Brit. W. I. 573. 1864, non Schrader, 1806.

Fig. 47. G-L; 65. G

Coarse, emergent, rhizomatous perennial, 1-3 m tall; rhizome horizontal, 1-2 cm thick, often emitting stout stolons; sheathing base of culm 2-5 cm wide. Culms solitary, sometimes proliferous from lower nodes, rounded-trigonous to terete, stiff, hardened, finely striate, glabrous, 4-15 mm wide. Leaves numerous; sheaths slightly spongy-thickened, adaxially septate-nodulose, basal sheaths brown, the inner band longitudinally yellow-brown medially, deeply U-shaped at orifice; ligule absent; blades broadly linear, flattened, 60-130 cm × 7-15 mm, thickly coriaceous, antrorsely serrulate-scabrous on margins and abaxial midvein, attenuate to triquetrous, caudate apex. Inflorescence a terminal and series of 3-7 lateral corymbs from the upper leaf-like bracts, these remote proximally, subcontiguous towards apex; corymbs dense, (2-) 3.5-9 (-14) cm diam., branches flattened, the spikelets congested in globose or fasciculate heads of 3-12 at branch tips, 4-9 mm in diam; spikelets ovoid-ellipsoid to broadly so, 3-4.7 × 1-2 mm, with 6-8 scales; fertile scales broadly ovate or ovate-elliptic, membranous, rusty brown, midcosta 1-nerved, pale, inconspicuous, not prolonged or only very shortly so beyond the obtuse to subacute apex; sterile scales ovate to broadly ovate, otherwise like the fertile, reducing in size towards base of spikelet. Anthers 2-3.5 mm long, with a subulate, black apiculum. Achene ovoid-globose, 2.5-3.2 × 1.2-1.7 mm, longitudinally wrinkled when dry, long-beaked at apex, sub-rounded at base, estipitate, brown.

General distribution: Southern United States, Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico: Primarily in coastal areas; growing in lakes, swales, and marshes; also collected in a quarry near Santurce (San Juan). Arecibo, Cataño, Cidra, Humacao, Manatí, Mayagüez, Río Grande, San Juan, Vega Baja, and Yauco.

Common names: Puerto Rico: *Cortadora de ciénaga, Serrucho.*

Selected specimens examined: PUERTO RICO: Arecibo: Bo. Islote, Caño Tiburones, *Axelrod et al. 10514* (UPRRP, US). Cataño: in paludosis, *Sintenis 1214* (US); Puerto Salinas, *González-Más 2127* (US). Cidra: Pueblo Viejo, *Hioram 101* (US). Humacao: Playa of Humacao: "Pozal", *Eggers 681* (US). Manatí: circa Lagunam Tortuguero, *Sintenis 6814* (US). San Juan: Santurce, 2 mi. E of stone quarry, *Heller & Heller 1274* (US); Martín Peña, *Stevenson 1876* (US). Vega Baja: Bo. Algarrobo, along open shore at E end of Laguna Tortuguero, *Proctor 45651* (US). Yauco: *Sargent 681* (US).

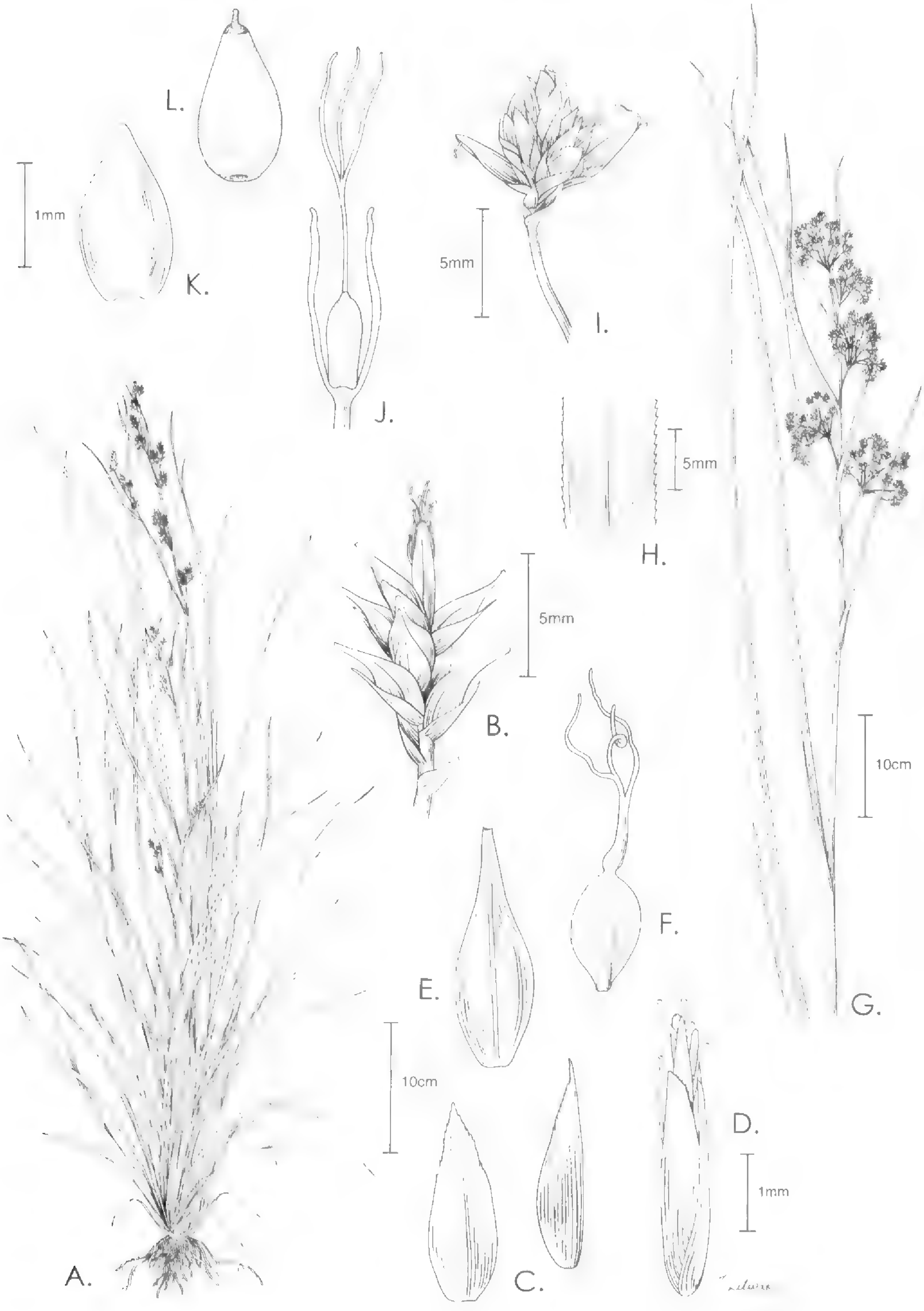


Fig. 47. A-F. *Carex polystachya.* **A.** Habit. **B.** Inflorescence spike. **C.** Spikelet scales, dorsal view and lateral view. **D.** Terminal staminate portion of spike. **E.** Perigynia. **F.** Achene. **G-L.** *Cladium jamaicense.* **G.** Upper portion of habit with inflorescence. **H.** Detail of leaf blade. **I.** Inflorescence branch. **J.** Flower. **K.** Spikelet scale. **L.** Achene. (A-F, from *Proctor 48897*; G, from *Proctor 45651*; H, from *Proctor 45651*; I-L, from *Proctor 43811*).

5. CYPERUS

Cyperus L., Sp. Pl. 44. 1753.

Perennial or annual glabrous herbs; rhizomes, when present, short or stoloniferous, rarely elongate and horizontally creeping. Culms trigonous or sometimes terete, smooth or scabrous, green. Leaves primarily basal with several often lower cauline; sheaths, at least the uppermost, rarely bladeless, finely veined, sometimes cross-veined, usually glabrous, the ventral (inner) band membranous, often reddish dotted, with a truncate to U- or V-shaped orifice; ligule absent or short; blades herbaceous or stiffened, flattened, V-shaped, plicate, inrolled, terete, or crescentiform, finely veined abaxially, finely cellular-reticulate and semi-glossy adaxially, sometimes septate or cross-veined, the margins, abaxial midvein, and adaxial lateral veins, when present, usually antrorsely scabrous, green. Inflorescence a simple or compound, terminal, umbel-like corymb, rarely congested or pseudolateral and head-like; involucral bracts generally leaf-like, approximate, spreading in a radius, the lowermost one longest, the upper successively shorter, or the lowest erect and appearing as a continuation of the culm, green; rays generally unequal in length, finely ribbed, trigonous, compressed-trigonous, or obscurely so, glabrous, rarely scabrous, prophyllate at base, the lowermost each borne from the axil of a single involucral bract, the uppermost borne just below the base of the central spike, these frequently flexuous, becoming divergent to reflexed at maturity; spikes solitary or subumbellate at ray tips, the central spike usually sessile or subsessile; spikelets ovate, ovate-lanceolate, or linear in shape, flattened, compressed or subcompressed, subcylindrical, or 4- angled in cross section, palmately, pinnately, or imbricately arranged on the rachis, many-flowered, the lowermost scale and subtending bract empty; scales 2-ranked, ovate, oblong-ovate or elliptic, acutely keeled, boat-shaped, or sub-rounded in cross section, sometimes 2-keeled, often longitudinally veined on sides, with a 1- to 5-nerved often greenish carina, usually glabrous, the apex acute, obtuse, or cuspidate, often mucronulate; rachilla winged from the persistent, decurrent base of the scale, or wingless, the wings hyaline or sometimes corky or thickened, disarticulating at base from the rachis, the whole spikelet falling entire, or disarticulating at the nodes, the internodes, scales, and achenes falling as 1-fruited segments, or rachilla persistent on the rachis, the scales and achenes deciduous. Flowers bisexual; hypogynous squamellae or bristles absent; stamens 1-3, the anthers elliptic, oblong-elliptic, lanceolate or linear, apiculate or sometimes minutely appendaged at apex; styles 2- or 3-branched, slender, uniform, the branches minutely scaly, shorter than to exceeding the smooth unbranched portion. Achene trigonous or lenticular, ovoid, obovoid, oblong-obovoid, ellipsoid, or narrowly-ellipsoid, usually short-apiculate at apex, sometimes shortly stipitate at base, the surface puncticulate, reticulate, or smooth, rarely transversely wrinkled. A cosmopolitan genus with approximately 650 species, in temperate, subtropical, and tropical regions.

LECTOTYPE: *Cyperus esculentus* L., designated by Britton, Bull. Dept. Agric. Jamaica 5, Suppl. 1: 6. 1907.

References: Kükenthal, G. 1935. Cyperaceae-Scirpoideae-Cypereae. *In:* A. Engler, Das Pflanzenreich IV. 20 (Heft 101): 1-671. McLaughlin, A. D. 1944. The genus *Cyperus* in the West Indies. Catholic Univ. Amer. Biol. Stud. 5: i-viii, 1-108. Tucker, G.C. 1994. Revision of the Mexican species of *Cyperus* (Cyperaceae). Syst. Bot. Monogr. 43: 1-213.

Key to the species of *Cyperus*

1. Style 2-branched; achenes lenticular or biconvex, generally borne with an edge, or in *C. laevigatus* a face, against the rachilla..... 2
   2. Inflorescence a pseudolateral capitate head of loosely subdigitate spikelets at the summit of the culm; involucral bracts 1, culm-like, erect, appearing as a continuation of the culm; spikelets 1 mm thick; achene borne with a face against the rachilla .....23. *C. laevigatus*
   2. Inflorescence a terminal, open or contracted, umbel-like corymb with ascending rays; involucral bracts (1-) 2-7, leaf-like, ascending to spreading; spikelets 0.5-0.6 mm thick; achene borne with an edge against the rachilla..... 3

3. Achene pericarp with rectangular, longitudinally elongate cells forming transverse undulations..... 14. *C. flavescens*
3. Achene pericarp with isodiametric cells, not forming transverse undulations..... 4
4. Spikelets linear-lanceolate to linear, 1-1.6 (-2) mm wide; scales (1.2-) 1.4-1.8 (-2) × 0.8-1.5 mm; anthers 0.4-0.6 mm long; achenes 0.8-1 (-1.2) × 0.4-0.6 mm .....31. *C. polystachyos*
4. Spikelets lanceolate to ovate-lanceolate or oblong-lanceolate, 3-5 mm wide; scales 3-5 × 2-2.6 mm; anthers 2-2.8 mm long; achenes 1.1-1.3 × 0.8-1.1 mm .....41. *C. unioloides*

1. Style 3-branched; achenes trigonous or sometimes dorsiventrally compressed, borne with a face against the rachilla..... 5
5. Leaves reduced to bladeless sheaths..... 6
6. Culm with transverse septa ..... 2. *C. articulatus*
6. Culm without transverse septa..... 7
7. Culms triquetrous to nearly 3-winged, soft and friable, easily compressed, (1-) 1.8-5 (-5.5) mm wide, sheathing bases 3-8 mm wide; involucral bracts 2 (-3) ..... 19. *C. haspan*
7. Culms trigonous to obtusely trigonous or subterete, firm, 3-30 mm wide, sheathing bases 7-50 mm wide; involucral bracts 6 or more..... 8
8. Primary involucral bracts 6-8, up to 10 cm long; rays 100-200..... 29. *C. papyrus*
8. Primary involucral bracts (6-) 8-25, 15-45 cm long; rays 35 or fewer..... 9
9. Culms (6-) 8-30 mm wide; involucral bracts of varying lengths, gradually and narrowly acuminate at apex; spikelets linear-lanceolate, 0.8-1.2 mm wide; scales ovate-elliptic, carina 5- to 7-nerved; achenes 0.9-1.2 mm long; rachilla unwinged (wings deciduous) ..... 18. *C. giganteus*
9. Culms 3-9 mm wide; involucral bracts subequal in length, abruptly acute to acuminate at apex; spikelets ovate to lanceolate or oblong-lanceolate, 1.8-2.2 mm wide; scales ovate-deltate; carina 3-nerved, achene 0.6-0.8 mm long; rachilla hyaline-winged ..... 21. *C. involucratus*
5. Leaves, at least the uppermost on culm, with well-developed blades. 10
10. Spikelet scales dorsally 2-keeled or invaginated proximally. 11
11. Sheaths, leaves, and involucral bracts conspicuously cross-veined ..... 43. *C. virens*
11. Sheaths, leaves, and involucral bracts not conspicuously cross-veined..... 12
12. Culms retrorsely scabrid, at least distally; spikelets 1.5-2 mm wide; scales 1.2-1.5 × 0.7-0.9 mm; achenes 0.8-0.9 × 0.3 mm ..... 37. *C. surinamensis*
12. Culms smooth; spikelets 2-3 mm wide; scales (1.2-) 1.5-2 × 1.2-2 mm; achenes 1-1.5 × 0.4-0.7 mm ..... 28. *C. ochraceus*
10. Spikelet scales dorsally 1-keeled from apex to base, not invaginated proximally..... 13
13. Rachilla disarticulating into 1-fruited segments (the rachilla node and achene falling together), the wings becoming thick and corky at maturity, closely enveloping the achene; spikelets cylindrical and often flexuose..... 14
14. Leaf blades 1-2.3 mm wide; inflorescence a terminal corymb or reduced to 2-6 subfastigate spikelets, 1.2-5 × 0.7-3 cm; involucral bracts 1-3, the lowest erect, leaf-like but appearing as a continuation of the culm ..... 13. *C. filiformis*
14. Leaf blades 3.5-17 mm wide; inflorescence an umbel-like corymb with ascending rays, (1.5-) 2.5-32 (-40) cm in diam.; involucral bracts 4-15, ascending to spreading. 15
15. Inflorescence of densely congested, lobate heads of spikes at ray tips or a single lobate head at summit of the culm ..... 10. *C. eggersii*
15. Inflorescence of oblong or widely ovoid to subglobose spikes with laxly or sublaxly disposed spikelets at ray tips..... 16

16. Internodes of the spike rachis between spikelets less than 1 mm long; spikelets spicate or sometimes radiate, somewhat congested, the lower ones reflexed at maturity; scales reddish brown to dark brown on sides 15..... *C. flexuosus*
16. Internodes of the spike rachis between spikelets 1-5 mm wide; spikelets never radiate, rarely reflexed; scales light yellowish brown on sides..... 28. *C. odoratus*

13. Rachilla persistent (the scales and achenes deciduous) or disarticulating at base of spikelet (the spikelet falling entire), the wings hyaline and not becoming thick and corky nor closely enveloping achene, or absent; spikelets laterally compressed or subquadrate. 17
17. Inflorescence rays wanting or not evident; spikes sessile or essentially so, subtended by leaf-like involucral bracts, solitary or arranged in lobate or digitate clusters at the summit of the culm and bearing 2-many, subloosely, densely congested, or radiately spreading spikelets..... 18
18. Plants often with polymorphic inflorescences, these ranging from (2-) 4-15 (-24) cm diam., grading from contracted and head-like (rays not evident) to open corymbs with well-developed rays. 19
19. Spikes cylindrical with densely disposed spikelets, the rachis not clearly visible between the spikelets, not flattening when pressed and dried; florets 1-2 (-4) per spikelet ..... 1. *C. aggregatus*
19. Spikes ovoid to oblong-ovoid with subloosely disposed spikelets, the rachis clearly visible between the spikelets, flattening when pressed and dried; florets (2-) 4-38 (-44) per spikelet. 20
20. Spikelets 0.7-1.1 mm wide; anthers 0.3-0.5 mm long; achenes linear to narrowly oblong, 0.4-0.5 mm wide ..... 39. *C. tenuis*
20. Spikelets 1.4-3 mm wide; anthers 0.6-1.3 mm long; achenes obovoid, broadly obovoid, or ellipsoid-obovoid to oblong-obovoid, 0.6-1.1 mm wide..... 21
21. Leaf blades 1.5-3 mm wide; rachilla of spikelet without persistent hyaline-wings (wings caducous); carina at scale apex prolonged as a short, straight to slightly divergent awn, 0.5-1 mm long ..... 4. *C. compressus*
21. Leaf blades 2-12 (-15) mm wide; rachilla of spikelet with persistent hyaline-wings; carina at scale apex scarcely prolonged, merely short-mucronate..... 22
22. Scales brownish, 2-2.8 mm wide, the nerves coarse, evenly spaced, extending down to the scarious margins; achene obovoid to ellipsoid-obovoid, plane on the adaxial side, 0.8-1.1 mm wide ..... 3. *C. brunneus*
22. Scales reddish, 1.4-1.8 (-2) mm wide, the nerves, crowded towards the carina, not extending down to scarious margins; achene ellipsoid-obovoid to oblong-obovoid, slightly curvate on the adaxial side, 0.6-0.9 mm wide ..... 30. *C. planifolius*

18. Plants with small, uniform inflorescences, 0.3-1.5 cm in diam. 23
23. Spikelet scales concavely curvate-keeled..... 24
24. Culms scabid at apex; inflorescence globose or hemispherical; rachilla strongly flexuose, the mature spikelet scales and achenes appressed and conforming closely to it, not spreading; achene narrowly ellipsoid to ellipsoid-obovoid; scales widely ovate-elliptic, 1.4-2 mm wide; frequent, throughout Puerto Rico and the Virgin Islands ..... 40. *C. unifolius*
24. Culms smooth at apex; inflorescence obtriangular-hemispherical; rachilla weakly flexuose, the mature spikelet scales and achenes spreading away from it; achene linear-oblong; scales ovate elliptic, 0.8-1.2 mm wide; rare, only known from Puerto Rico on Mona Island and in Guánica ..... 16. *C. floridanus*

23. Spikelet scales convexly curvate-keeled or straight-keeled..... 25
25. Terminal spikelet scale dorsally gibbous or pouched, sterile..... 38. *C. swartzii*
25. Terminal spikelet scale not dorsally gibbous or pouched, fertile. 26
26. Involucral bracts strongly deflexed before disarticulation of spikelets from rachis, rarely the uppermost one slightly ascending; spikelets strongly deflexed, the terminal one often erect. 27
27. Spikelet scales 1.2-1.6 × 0.8-1 mm, finely 3- to 4-nerved; achenes oblong-ellipsoid, 1-1.2 × 0.5-0.6 mm, straight on adaxial side..... 26. *C. nanus*
27. Spikelet scales 1.5-2 × 1.2-1.6 mm, coarsely 4- to 5-nerved; achenes ovoid-ellipsoid, 1.1-1.4 × 0.5-0.7 mm, curvate on adaxial side ..... 36. *C. subtenuis*
26. Involucral bracts ascending to divergent, rarely slightly deflexed; spikelets ascending, radiately or hemispherically spreading, or rarely the lowermost several weakly deflexed..... 28
28. Apex of spikelet scales excurved-cuspidate, the sides often whitish stramineous with reddish or blackish lineations; margins and abaxial midvein of leaf blades often with both antrorsely and retrorsely set barbs ..... 42. *C. urbanii*
28. Apex of spikelet scale straight, the sides yellowish or reddish brown or dark brown to purple-black; margins and abaxial midvein of leaf blades with antrorsely set barbs only..... 29
29. Leaf blades (1-) 1.3-3 (-3.5) mm wide; inflorescence rounded or hemispherical; spikelets radiately spreading; scales straight-keeled to convexly curvate-keeled; achenes ellipsoid-obovoid to oblong-obovoid, 1-1.3 mm long ..... 17. *C. fuligineus*
29. Leaf blades 0.2-1.2 mm wide; inflorescence obtriangular-hemispherical; spikelets ascending; scales often concavely curvate-keeled; achenes linear-oblong, 1.3-1.6 mm long ..... 15. *C. floridanus*

17. Inflorescence with elongated rays (at least some spikes borne on elongated primary rays); spikes arranged in open to contracted, simple or compound, umbel-like corymbs with ascending rays... 30
30. Terminal spikelet scale dorsally gibbous or pouched, sterile ..... 38. *C. swartzii*
30. Terminal spikelet scale not dorsally gibbous or pouched, fertile..... 31
31. Culms, leaves, rays, and involucral bracts finely papillose..... 24. *C. ligularis*
31. Culms, leaves, rays, and involucral bracts not finely papillose..... 32
32. Spikelet scales (at least some) with a dark purplish red splotch along lower margin on each side ..... 34. *C. sphacelatus*
32. Spikelet scales lacking a dark purplish red splotch along lower margin on each side. 33
33. Apex of spikelet scale with an elongate, strongly recurved awn..... 35. *C. squarrosus*

33. Apex of spikelet scale straight or recurved-cuspidate..... 34
34. Spikelets arranged in narrowly to widely linear or cylindrical spikes; spikes digitately arranged at ray tips or in a simple digitate cluster at the summit of the culm 35
35. Inflorescence a simple, digitate cluster of spikes at the summit of the culm, essentially sessile or sometimes 1-2 short rays present..... 1. *C. aggregatus*
35. Inflorescence an open, compound corymb with ascending rays..... 36
36. Spikelets oriented at right angles to the axis of the spike..... 37

37. Spikelets with 1-3 (-5) florets, oblong-ellipsoid, slightly compressed to subquadrate, or broadly elliptic; scales 2.2-3.4 × 1.5-2.1 mm, coarsely (3-) 4-5 nerved on each side, light brownish to brown or reddish brown, dark brown lineolate, at least on margins ..... 25. *C. mutisii*
37. Spikelets with 12-30 florets, linear, compressed-rhombic; scales 1.4-2 × 1-1.3 mm, laterally weakly 1- to 2-nerved along carina, light to reddish brown on sides, with 2 dark brown stripes paralleling either side of carina ..... 8. *C. digitatus*

36. Spikelets strongly ascending to appressed to the axis of the spike..... 38
38. Caespitose annual or short-lived perennial, (5-) 12-60 (-75) cm tall; sheaths pale green to pale brown, the lowermost reddish tinged, reddish lineolate; leaf blades (1.5-) 2-6 mm wide, both the blades and involucral bracts not cross-veined abaxially or indistinctly so ..... 22. *C. iria*
38. Coarse, rhizomatous perennial, 70-150 cm tall; sheaths purple-black proximately, fading to brown streaked with black distally; leaf blades 4-15 (-18) mm wide, both the blades and involucral bracts cross-veined abaxially ..... 20. *C. imbricatus*

34. Spikelets arranged in globose, subglobose, or ovoid spikes; spikes solitary, spicately, or digitately arranged at ray tips..... 39
39. Spikelets digitately arranged, hence spikes without a conspicuous rachis..... 40
40. Plant with sticky leaves and inflorescence when fresh; culms remotely scabrous; spikelets (2-) 3-5 (-7) mm wide; scales 2.2-3.2 × 2-2.8 mm, with a slightly excurved-cuspidate or straight apex; achenes 1.3-1.9 × 0.7-1 mm ..... 11. *C. elegans*
40. Plants not sticky; culms smooth; spikelets ranging from 0.8-1.6 (-2) mm wide; scales ranging from 0.6-1.9 × 0.6-1 mm, with a straight, mucronate apex; achenes ranging from 0.5-0.8 × 0.3-0.5 mm. 41
41. Caespitose annual; spikes in dense, globose, often irregularly lobate clusters at ray tips, each with 20-140 spikelets; scales obovate to orbiculate, 0.6-0.8 mm long ..... 7. *C. difformis*
41. Rhizomatous perennial with short, horizontally creeping rhizome; spikes in hemispherical or rounded, open clusters at ray tips, each with (1-) 3-13 spikelets; scales oblong-ovate, 1.4-1.9 mm long ..... 19. *C. haspan*

39. Spikelets spicately arranged on a short to elongate spike rachis 42
42. Spikelets 0.5-0.6 mm wide; florets widely spreading to 1.8 mm wide with maturing achenes; spikelet scales remotely 2-ranked ..... 9. *C. distans*
42. Spikelets 0.7-3 mm wide; florets not widely spreading; spikelet scales closely 2-ranked. 43
43. Apex of spikelet scales cuspidate, slightly excurved; achene apiculum bulbous-thickened ..... 5. *C. confertus*
43. Apex of spikelet scales mucronate or short-awned, essentially straight; achene apiculum not bulbous-thickened 44
44. Caespitose annuals (lacking rhizomes); hyaline rachilla wings deciduous, not persistent 45
45. Spikelets 2.5-3 mm wide; spikelet scales lacking a dark purplish red splotch along lower margin on each side ..... 4. *C. compressus*
45. Spikelets 1.2-1.8 (-2) mm wide; spikelet scales often with a dark purplish red splotch along lower margin on each side or sometimes absent..... ..... 34. *C. sphacelatus*

44. Rhizomatous or caespitose perennials; hyaline rachilla wings persistent 46
46. Spikelets 0.7-1.3 mm wide 47
47. Inflorescence rays well-developed, often longer than the length of spikes borne at their tips; spikes subglobose ..... 6. *C. croceus*

47. Inflorescence rays often shorter than the length of spikes borne at their tips or wanting; spikes loosely ovoid to oblong-ovoid ..... 39. *C. tenuis*
46. Spikelets (1.2-) 1.4-2.8 mm wide 48
48. Rhizomes stoloniferous, bearing tubers 49
49. Involucral bracts elongate, the lowermost 2 generally exceeding the inflorescence, the lowest one 7-60 cm long; spikelet scales light brown or yellowish brown with 2-3 well-developed lateral nerves evident the length of the scale; eligulate ..... 12. *C. esculentus*
49. Involucral bracts generally shorter than to equaling the length of the inflorescence, or only the lowest one shortly exceeding the inflorescence, 1-9 (-14) cm long; spikelet scales dark reddish brown to purple-brown or blackish with only 1-2 indistinct lateral nerves evident only at proximal base of scale, the sides smooth for the most part; faintly short-ligulate on lower sheaths ..... 33. *C. rotundus*
48. Rhizomes short, non-stoloniferous 50
50. Spikelet scales uniformly light brown or light yellowish brown on sides with a conspicuous, elongate thickened mucro ..... 32. *C. pulguerensis*
50. Spikelet scales often stained dark brown, reddish brown, or reddish on sides, with an inconspicuous, minute or very short mucro 51
51. Scales brownish, 2-2.8 mm wide, the nerves coarse, evenly spaced, extending down to the scarious margins; achene obovoid to ellipsoid-obovoid, plane on the adaxial side, 0.8-1.1 mm wide ..... 3. *C. brunneus*
51. Scales reddish, 1.4-1.8 (-2) mm wide, the nerves, crowded towards the carina, not extending down to scarious margins; achene ellipsoid-obovoid to oblong-obovoid, slightly curvate on the adaxial side, 0.6-0.9 mm wide ..... 30. *C. planifolius*

1. Cyperus aggregatus (Willd.) Endl., Cat. Horti Vindob. 1: 93. 1842; *Mariscus aggregatus* Willd., Enum. Pl. 1: 70. 1809; *Cypreus flavus* var. *aggregatus* (Willd.) Kük. in Engler, Pflanzenr. IV. 20 (Heft 101): 532. 1936. Type: based on a cultivated plant (holotype: B-Willd. 1426).

Kyllinga cayennensis Lam., Tabl. Encycl. 1: 49. 1791; *Cyperus cayennensis* (Lam.) Britton, Bull. Dept. Agric. Jamaica 5: 8. 1907, non Willdenow ex Link, 1820; *Mariscus cayennensis* (Lam.) Urb., Symb. Antill. 2: 165. 1900. Type: French Guiana. *Von Rohr s.n.* (holotype: P-Lam.).

Mariscus flavus Vahl, Enum. Pl. 2: 374. 1805; *Cyperus flavus* (Vahl) Nees, Linnaea 19: 698. 1847, non J. Presl & C. Presl, 1828. Lectotype: St. Croix, U.S. Virgin Islands. *Von Rohr 70* (C-Vahl), designated by G. C. Tucker & McVaugh in McVaugh, Fl. Novo-Galiciana 13: 279. 1993.

Caespitose perennial, 13-90 (-110) cm tall; rhizome short, decumbent, knotty. Culms loosely tufted, rigid, triquetrous distally, trigonous proximally, finely ribbed, often antrorsely spinulose-scabrous on angles distally, smooth proximally, (0.8-) 1-2.7 (-3.3) mm wide, sheathing bases 2-7 mm wide. Leaves 5-8, basal and lower cauline; sheaths purple-tinged or light red-brown proximally, green distally; ligule absent; blades linear, flattened-plicate or V-shaped proximally, 9-60 cm × 2-7 mm, antrorsely spinulose-scabrous on the margins and abaxial midvein, attenuate to triquetrous apex. Inflorescence a simple umbel-like corymb with few rays, often contracted to a radiate cluster of 2-8 (-10) sessile to subsessile spikes, 2-7 (-10) × 1.5-5 cm; involucral bracts 4-8, leaf-like, spreading, the lowermost to 30 cm long; rays essentially absent or 3-10 short ones, several sometimes to 5 cm long; spikes 6-20 (-30) × 5-8 (-10) mm, cylindrical to oblong-cylindrical with 20-80 densely disposed, spicately arranged spikelets, which are each subtended by a linear-setaceous bract at base that equals or exceeds the spikelet; spikelets spreading, elliptic to oblong-elliptic, subquadrate, 2-3.5 × 0.9-1.3 mm, acute at apex, cuneate to short-cuneate at base, with 1-2 (-4) florets; rachilla broadly hyaline-winged; scales 4-5, the lowermost two reduced and sterile; fertile scales ovate to ovate-elliptic or broadly ovate-elliptic, obtusely curvate-keeled, 2.3-3.2 × 1.8-2.6 mm, submembranous, with 3-4 coarse nerves on each side above the broad margins which

often clasp the mature achenes, narrowly scarious, stramineous to yellowish brown, often dark red lineolate on sides, semi-glossy, carina 3-nerved, green, shortly prolonged beyond the obtuse apex as a mucro. Stamens 3, the anthers 0.4-0.7 mm long, bluntly apiculate; styles 3-branched. Achene trigonous with concave sides, obovate to elliptic-obovate or broadly ellipsoid, 1.5-1.9 (-2.1) × 0.8-1.1 mm, obtuse to rounded at apex, apiculate, short-cuneate at base, estipitate, essentially smooth to finely puncticulate, dark brown to reddish brown at maturity.

General distribution: Southern United States (Louisiana, west to New Mexico), West Indies, Mexico, Central America, tropical and subtropical South America; adventive in Australia.

Distribution in Puerto Rico and the Virgin Islands: In sandy soils of a variety of habitats including road banks, rocky woods and hillsides, marshy areas, stream margins, savannas, cultivated fields, lawns, pastures, and waste areas. Adjuntas, Bayamón, Cabo Rojo, Coamo, Dorado, Guayama, Humacao, Jayuya, Juncos, Loíza, Manatí, Maricao, Mayagüez, Moca, Peñuelas, Río Piedras, Salinas, Sabana Grande, San Germán, San Juan, San Sabastián, Utuado, and Vega Baja; Buck Island, St. Croix, and St. Thomas.

Selected specimens examined: PUERTO RICO: Adjuntas, Alto de la Bandera, *N.L. Britton & Hess 2137* (US). Cabo Rojo: Sierra Bermeja, *Proctor & McKenzie 44021* (US). Dorado: Bo. Higuillar, just E of Aeropuerto de Dorado, *Proctor 42454* (US). Jayuya, *Sargent 3093* (US). Juncos: in Mt. Florida, *Sintenis 1904* (US). Loíza, *Stevenson 5480* (US). Manatí: Bo. Tierras Nuevas Saliente, *Proctor & Thomas 43802* (US). Moca: *Sargent 402* (US). Salinas: Sabana Llaña, *Stevenson 1256* (US). San Juan: Along the beach at Santurce, *Heller 4683* (US). Utuado: vicinity of Utuado, *E.G. Britton 5213* (US). Vega Baja: Tortuguero, Rd. 687, km 2, *González-Más 1047* (US). ST. CROIX: Bassin, *A.E. Ricksecker 483* (US).

2. Cyperus articulatus L., Sp. Pl. 44. 1753. Lectotype: Jamaica. Sloane, *Voy. Jamaica 1: t 81, f. 1. 1707*, designated by G. C. Tucker, Syst. Bot. Monogr. 2: 42. 1983.

Rhizomatous perennial, (50-) 70-260 (-300) cm tall; rhizome elongate, horizontally creeping, hardened, scaly, 2-8 mm thick, often tuberous-thickened below base of culm. Culms forming in a row along the rhizome, approximate or widely spaced, terete to obtusely trigonous distally, tapering to apex, with transverse septa, essentially smooth, 2-14 mm wide, sheathing bases 4-18 mm wide. Leaves reduced to bladeless sheaths or occasionally 1-2 (-4) blades present, basal and lower cauline; sheaths prominently cross-veined, tinged with purple or purple-brown proximally, becoming fibrillose, the bladeless ones oblique at orifice, dorsally acute to acuminate; ligule absent; blades when present, linear-lanceolate, flattened-plicate or V-shaped, 9-20 (-40) cm × 3-6 (-9) mm, prominently cross-veined, antrorsely scabrous on margins, -short-attenuate to triquetrous apex. Inflorescence an open, compound corymb, 4-15 (-18) × 3-11 (-16) cm; involucral bracts 2-3, leaf-like, erect, 1-2 (-10) cm long, often inconspicuous, shorter than the inflorescence; primary rays 5-7, to 10 cm long, wire-like, erect to curving; secondary rays sometimes present, to 20 mm long; spikes 4-30, broadly ovoid to obloid, 1-4.5 × 1-3.5 (-4.5) cm, with (1-) 4-10 spikelets; spikelets linear 8-32 (-55) × 1.1-2 mm, compressed, tapering to acuminate apex, cuneate at base, with 10-43 (-60) florets; rachilla narrowly to broadly hyaline-winged at maturity; scales oblong-elliptic to ovate, acutely curvate-keeled, 2.6-3.7 × 1.1-1.8 mm, submembranous, with 1-2 nerves on each side above the scarious margins, light brown to brown on sides, carina 3-nerved, green, narrowed to a short subulate tip just below the acute to obtuse apex. Stamens 3, the anthers 1.3-2.4 mm long, bluntly apiculate; styles 3-branched. Achene 3-sided with concave faces, slightly dorsiventrally compressed, obovoid-ellipsoid, 1.2-1.6 × 0.4-0.6 mm, rounded to markedly apiculate apex, short-cuneate at base, substipitate, puncticulate, brown to dark brown at maturity.

General distribution: Pantropical and warm-temperate regions; southeastern United States (South Carolina to Texas), West Indies, Mexico, Central America, South America; and Old World tropics.

Distribution in Puerto Rico and the Virgin Islands: In wet areas of low swampy grounds, marshes, lake borders, pastures, and roadside ditches. Cabo Rojo, Caguas, Carolina, Fajardo, Guánica, Gurabo, Humacao, Juana Díaz, Juncos, Lajas, Loíza, Naguabo, Santa Isabel, Vega Baja, and Yabucoa; St. Croix, St. Thomas, and Tortola.

Common name: Puerto Rico: *Junco cimarrón.*

Selected specimens examined: PUERTO RICO: Cabo Rojo: Bo. Llanos Costa, *Proctor & McKenzie 43770* (US). Caguas: *Sintenis 2549* (US). Carolina: Canovanillas, Hwy 165, km 14.9, *González-Más 129* (US). Guánica: West end of Lake Guánica, *Sargent 578* (US). Gurabo: *Sintenis 2548* (US). Humacao: Playa de Humacao, *Eggers 670* (US). Juncos: *Sintenis 2503* (US). Lajas: Laguna Cartagena, *Liogier et al. 30568* (US). Loíza: Vacía Talega, *Woodbury et al. s.n.* (US); Loíza road, *Stevenson 5467* (US). Naguabo: *N.L. Britton & Hess 2319* (US); Sierra de Naguabo, Loma Icaco, *Shafer 3416* (US). Vega Baja: Pto. Nuevo, Rd. 686, km 3.4, *González-Más 1109* (US). Yabucoa: *Sintenis 5119* (US).

3. Cyperus brunneus Sw., Fl. Ind. Occid. 1: 116. 1797; *Mariscus brunneus* (Sw.) C. B. Clarke in Urban, Symb. Antill. 2: 51. 1900; *Cyperus planifolius* var. *brunneus* (Sw.) Kük., Repert. Spec. Nov. Regni Veg. 23: 189. 1926. Type: West Indies. *Swartz s.n.* (holotype: S-Sw. no. R-1383; isotype: M).

Cyperus brizaeus Vahl, Enum. Pl. 2: 316. 1805; *Mariscus brizaeus* (Vahl) C. B. Clarke in Urban, Symb. Antill. 2: 52. 1900. Lectotype: French Guiana; Cayenne. *Richard s.n.* (C-Vahl), designated by G. C. Tucker, Syst. Bot. Monogr. 43: 145. 1994.

Cyperus evaginatus Boeck., Linnaea 36: 351. 1870. Type: United States; Florida. Collector unknown (holotype: B, destroyed).

Cyperus ottonis Boeck., Linnaea 36: 350. 1870. Type: Cuba. *Otto s.n.* (holotype: B, destroyed).

Cyperus discolor Boeck., Beitr. Cyper. 1: 7. 1888. Type: St. Thomas, U.S. Virgin Islands. *Kuntze s.n.* (holotype: B, destroyed).

Cyperus krugii Boeck., Beitr. Cyper. 1: 8. 1888. Type: Puerto Rico; Bayamón. *Sintenis s.n.* [collection number not designated in protologue] (holotype: B, destroyed).

Rhizomatous perennial, (10-) 15-80 cm tall; rhizome short, thickened. Culms trigonous to obtusely so proximally, 1.2-4 mm wide, coarsely ribbed, smooth, sheathing bases 6-15 mm wide. Leaves 5-13, crowded at base, 1-2 lower cauline; sheaths short, red-brown to purple-black proximally; ligule absent; blades narrowly linear, somewhat stiff, flattened-plicate, 10-90 cm × 2-9 mm, the lowermost often equaling or overtopping culms, pale green to green, faintly reddish brown lineolate on adaxial surface, whitish green abaxially, indistinctly cross-veined proximally, antrorsely scabrous on margins and midvein beneath, long-acuminate to triquetrous apex. Inflorescence a simple to partially compound umbel-like corymb, open, or more often congested in one head-like lobed cluster, 2-8 (-13) cm in diam.; involucral bracts 3-5, leaf-like, elongate, the lowest to 60 cm long, the upper linear, subulate; rays (when evident) 2-7, 1-7 cm long; spikes broadly ovoid, 2-4 cm diam., with 12-38 (-50) spikelets; spikelets lanceolate or elliptic-lanceolate to oblong-lanceolate, (6-) 8-20 × 2-2.8 mm, divergent, subcompressed, abruptly acute or obtuse at apex, cuneate at base, with 6-26 florets; rachilla thickened, broadly hyaline-winged; scales broadly ovate to oval, obtusely keeled in cross section, 2.4-3.2 × 1.5-2.2 mm, chartaceous to thinly coriaceus, coarsely 4-6 nerved on each side above the narrow scarious margins, light brown and stained with red-brown or dark yellowish brown, carina 3-nerved, narrow, inconspicuous, pale-green, prolonged at the acute to obtuse apex as a short mucro. Stamens 3, the anthers 1-1.3 mm long, with a minute, rounded, black appendage at apex; styles 3-branched. Achene trigonous with adaxial face plane to slightly concave, abaxial faces slightly convex, subdorsiventrally compressed, obovoid to ellipsoid-obovoid, 1.2-1.8 × 0.8-1.1 mm, obtuse at apex, apiculate, cuneate at base, estipitate, puncticulate, blackish at maturity.

General distribution: Southern United States (southern Florida), coastal areas and cays of eastern Mexico and Central America, and the West Indies.

Distribution in Puerto Rico and the Virgin Islands: In sand or sandy soils of coastal habitats including borders of salt ponds, dunes, ecotones between beach and scrub, scrub, coastal thickets, limestone slopes and flats, strand vegetation, roadsides, and disturbed areas. Adjuntas, Aguadilla, Arecibo, Cabo Rojo, Carolina, Cayo Ahogado, Cayo Diablo, Cayo Icacos (Ratones), Cayo Lobos, Cayo Palominos, Cayo Ramos, Desecheo, Fajardo, Guánica, Guayama, Guayanilla, Hatillo, Humacao, Isabela, Isleta Marina, Lajas, Loíza, Manatí, Mona Island, Ponce,

Quebradillas, Rincón, Río Grande, Salinas, San Juan, Vega Baja, Vieques, and Yauco; Anegada, St. Croix, St. John, St. Thomas, Tortola, and Water Island.

Selected specimens examined: PUERTO RICO: Adjuntas: *Sintenis 4664* (US). Arecibo: *Sargent 767* (US); Bo. Islote, Punta Caracoles, *Proctor & Rivera 46277* (US). Cabo Rojo: Rt. 102, Joyudas, *González-Más 628* (US). Carolina: Boca de Cangrejos, *González-Más 1029* (US); Punta Cangrejos, *Stevenson & Johnston 1707* (US).Cayo Diablo, La Cordillera Cays, *Fosberg 52282* (US). Fajardo: Fajardo Lighthouse, *Heller & Heller 1168* (US). Guánica: below Guánica State Forest, *Strong et al. 441* (US). Humacao: Playa Humacao, *González-Más 93* (US). Isleta Marina (Obispo), *Woodbury et al. s.n.* (US). Lajas: La Parguera, *Sargent* 43 (US). Manatí, *Sintenis 6690* (US). Mona Island: Sardinera, *Otero & Chardón 982* (US). Ponce: Rt. 2, km 16.6, Los Cuchares, *González-Más 798* (US). Quebradillas: Bo. San José, *Axelrod 10811* (UPRRP, US). Rincón, ad Puntas, *Sintenis 5694* (US). Salinas: Bo. Aguirre, Jobos Bay, *Proctor & Delgado 46362* (US). San Juan: Park of Santurce, *Hioram 811* (US); San Juan, *Underwood & Griggs 915* (US). Vega Baja: Bo. Cibuco, *Proctor et al. 45555* (US). Vieques Island: Santa Maria to Caballo, *Shafer 2685* (US). ANEGADA: West End, *Britton & Fishlock 982* (US). ST. CROIX: Sandy Point, *Acevedo-Rdgz. et al. 5309* (NY, US); Pinetree Bay, *Ricksecker 334* (US). ST. THOMAS: Kaornsight, *Eggers s.n.* (US).

4. Cyperus compressus L., Sp. Pl. 46. 1753. Lectotype: Jamaica. Sloane, *Voy. Jamaica 1: t. 76, f. 1. 1707*, designated by Du Puy et al. in A.S. George et al. (eds.), Fl. Australia 50 (Oceanic Islands 2): 446. 1993.

Cyperus compressus var. *capillaceus* C. B. Clarke in Urban, Symb. Antill. 2: 32. 1900. Type: Dominica. *Imray 430* (holotype: probably at K).

Densely tufted annual, (3-) 5-40 (-60) cm tall; roots many, fine, capillary. Culms 3-angled, finely ribbed, smooth, 0.8-1.7 (-2.0) mm wide. Leaves 2-7 primarily basal, often 1-2 lower cauline; sheaths red-tinged to purple-brown; ligule absent; blades folded to subflattened, frequently curved, 3-30 cm × 1.5-3 mm, smooth to remotely antrorsely scabrous on margins, acuminate to triquetrous apex. Inflorescence an umbel-like corymb, 5-15 (-24) cm diam., or a sessile or subsessile, solitary spike; involucral bracts 3-5, 2.5-18 cm × 1.2-3.0 mm, leaf-like; rays 0-5, unequal, 3-angled to subcompressed, spreading, to 9 cm long, 0.5-0.9 mm wide, ribbed, smooth; spikes hemispherical to rhomboid-obovoid, 1.1-3.5 × 1.2-5.0 cm, with 3-18 spikelets; spikelets approximate, oblong-elliptic to lance-oblong, spreading, 8-25 × 2.5-3.0 mm, subcompressed, acute at apex, short-cuneate at base, with (9-) 12-38 (-44) florets; rachilla flat, hyaline-winged, the wings caducous; scales deciduous, ovate to broadly ovate, acutely keeled dorsally, 2.6-3.5 × 2.0-2.5 (-3.0) mm, herbaceous, 4- to 5-nerved on each side above the whitish scarious margins, the sides green or light brown, sometimes tinged with yellow, carina broad, green, 3-nerved, prolonged beyond the acute to acuminate apex as a stiff, well-developed, sharp-tipped mucro, 0.5-0.7 mm long. Stamens 3, the anthers 0.6-0.9 mm long, with a prolonged lanceolate apex; style 3-branched. Achene trigonous with concave sides, 1.1-1.5 × 1-1.1 mm, obovoid to broadly obovoid, obtuse to 3-lobed at apex, minutely apiculate, short-cuneate at base, brown, shiny, minutely reticulate, appearing smooth, obscurely ribbed on the angles.

General distribution: Cosmopolitan; although more common in warmer regions.

Distribution in Puerto Rico and the Virgin Islands: Sandy soils of wet areas, meadows, depressions, roadsides, road banks, river banks, clearings, grassy flood plains, coastal habitats, cane fields, lawns, and waste areas. Arroyo, Bayamón, Cabo Rojo, Caguas, Carolina, Cataño, Ceiba, Culebra, Fajardo, Guayanilla, Humacao, Juana Díaz, Juncos, Lajas, Las Piedras, Loíza, Manatí, Maunabo, Mayagüez, Naguabo, Patillas, Río Grande, San Juan, Vega Alta, Vega Baja, Vieques, and Yabucoa; Anegada, St. John, St. Thomas, and Virgin Gorda.

Note: G. C. Tucker (Syst. Bot. Monogr. 43: 103. 1994) cites *Clayton 598* (BM) as the type of *Cyperus compressus* L. However, that specimen is a different species, *Cyperus bipartitus* Torr. Fortunately, Du Puy et al. had lectotypified the name in its current sense a year earlier.

Selected specimens examined: PUERTO RICO: Bayamón: Rd. 2, km 14.6, *González-Más 1125* (US). Carolina: Boca de Cangrejos, *González-Más 1021* (US). Cataño: Palo Seco, *González-Más 2117*

(US). Ceiba: Bo. Machos, *Axelrod & Rogowitz 10822* (UPRRP). Culebra Island: *N.L. Britton & Wheeler 46* (US). Guayanilla: Rd. 336, *González-Más* 818 (US). Humacao: Cotto Wakí, km 27.1, *González-Más 74* (US). Juana Díaz: Pastillo, *González-Más 751* (US). Juncos: locis cultis in monte Florida, *Sintenis 1939* (US). Manatí: Bo. Tierras Neuvas Saliente, *Axelrod et al. 11400* (UPRRP). Maunabo: La Pica, km 105.1, *González-Más 1339* (US). Mayagüez: Athletic field, College of Agriculture, *González-Más 515* (US). Naguabo: Rd. 3, km 4.1, *González-Más* 1365 (US).Vieques Island: Playa de Esperanza, *Shafer 2748* (US). St. John: Lameshur, *Woodbury 775a/7208* (VINPS). Virgin Gorda: Near Valley, *N.L. Britton & Fishlock 1067* (US).

5. Cyperus confertus Sw., Prodr. 20. 1788; *Mariscus confertus* (Sw.) C. B. Clarke in Urban, Symb. Antill. 2: 50. 1900. Type: Jamaica. *Swartz s.n.* (lectotype: S-Sw. R-1384; isolectotypes: B-Willd. 1349, S), here designated.

Rhizomatous perennial, (2-) 6-50 (-75) cm tall; rhizome short; culms tufted or solitary, forming small cormlike enlargements at base with age, trigonous, smooth, (0.5-) 1-2 (-2.5) mm wide, sheathing bases 1-5 mm wide. Leaves 2-6, all basal or 1-3 lower cauline; sheaths often cross-veined proximally, pale green, tinged with red or brownish purple; ligule absent; blades linear, 3-35 cm × (0.5-) 1-5 (-7.5) mm, subflattened, soft, thinly herbaceous, smooth or with antrorsely scabrous margins and abaxial midvein distally, long-acuminate to triquetrous apex. Inflorescence a simple umbel-like corymb with ascending rays or congested in a head in poorly developed individuals, (0.9-) 1.5-11 (-16) cm in diam.; involucral bracts leaflike, 2-6, elongate, 2-3 times as long as the inflorescence; rays 2-5, slender, patent, 1-9 (-13) cm long; spikes globose-ovoid, 10-15 mm in diam., with 3-32 spikelets; spikelets subdigitately to spicately disposed on an abbreviated axis, dense, divergent proximally, jointed at base, oblong-lanceolate, 6-10 × 2-2.2 mm, compressed, obtuse at apex, short-cuneate to sub-rounded at base, with 6- to 18-flowered; rachilla very narrowly hyaline-winged; scales ovate, dorsally acute, 2-2.5 × 1.8-2 mm, thinly herbaceous, 3- or 4-nerved on both sides, straw-colored or light yellowish brown, carina 3-nerved, wide, green, extending beyond the apex as a 0.3 mm long distinctly to slightly excurved cusp. Stamens 3, the anthers 0.2-0.5 mm long, bluntly apiculate; style 3-branched. Achene trigonous with concave faces, obovoid to ellipsoid-obovoid, 1-1.4 × 0.7-0.8 mm, rounded above to a mucronulate, somewhat bulbous-thickened apex, tapered at base, puncticulate, brown to blackish.

General distribution: West Indies, South America, and Galapagos Islands.

Distribution in Puerto Rico and the Virgin Islands: Sandy soils of coastal areas, along forest trails, grassy areas, scrub forests, and thickets. Cataño, Coamo, Guayama, Loíza, Manatí, and Salinas; St. Croix, St. Thomas, Tortola, and Virgin Gorda.

Selected specimens examined: Puerto Rico: Manatí: Bo. Tierras Nuevas Saliente, *Axelrod et al. 11491* (UPRRP). St. Thomas: *Eggers s.n.* (US).

6. Cyperus croceus Vahl, Enum. Pl. 2: 357. 1805. Type: United States; South Carolina (cited by Vahl as "Puerto Rico" in protologue, see note below) *Bosc s.n.* (holotype: C-Vahl).

Cyperus globulosus sensu many authors, non Aublet, 1775.

Mariscus echinatus sensu C. B. Clarke in Urban, Symb. Antill. 2: 43. 1900, non (Linnaeus) Elliott, 1816.

Mariscus globulosus sensu Urban, Symb. Antill. 4: 113. 1903, non (Aublet) Urban, 1900.

Rhizomatous perennial, 9-75 cm tall; rhizome short and thickened or shortly horizontally creeping. Culms caespitose, slightly bulbous-based, trigonous to obtusely so proximally, coarsely ribbed, smooth, 1-2.2 (-3) mm wide, sheathing bases 4-9 mm wide. Leaves 5-13, primarily basal, 1-3 lower cauline; sheaths short, pale brown, often reddish tinged and fibrillose proximally; ligule absent; blades linear, flattened to widely V-shaped or subplicate, 10-44 (-50) cm × (1.5-) 2.2-5 (-7) mm, antrorsely scabrous on the margins and abaxial midvein, attenuate to triquetrous apex. Inflorescence a simple umbel-like corymb of ovoid to spherical heads of spikelets at the tips of 6-13 ascending to divergent rays, (2-) 3-12 (-14) × 4-16 cm; involucral bracts 4-11, leaf-like, spreading, the lowermost elongated, greatly exceeding the inflorescence, to 30 cm long;

spikes globose, 7-15 (-20) × 7-18 mm, with 14-60 spikelets; spikelets lanceolate to oblong-lanceolate, subcompressed, quadrate, 5-10 × 0.7-1.3 mm, acuminate at apex, cuneate at base, with 4-6 florets; rachilla broadly hyaline-winged; scales ovate, acute to obtuse dorsally, 2.3-3.2 × 1.8-2.2 mm, herbaceous, with 3-4 coarse nerves on each side above the scarious margins, greenish brown to yellowish brown, carina 3-nerved, green, prolonged beyond the obtuse to acute apex as a short, antrorsely scabrous mucro. Stamens 3, the anthers 0.4-0.6 mm long, bluntly apiculate; style 3-branched. Achene trigonous, curved on side facing rachilla, with plane or concave faces, oblong-ellipsoid, 1.5-2 × 0.4-0.8 mm, obtuse to subtruncate at apex, apiculate, short-cuneate at base, substipitate, puncticulate, reddish brown to blackish.

General distribution: Southeastern United States, West Indies, Central America, and South America.

Distribution in Puerto Rico: Sandy savannas, roadside ditches, lawns, pastures, and disturbed areas; primarily from Laguna Tortuguero to Dorado. Cabo Rojo, Carolina, Dorado, Manatí, San Juan, and Vega Baja.

Note: Carter & Kral, (Taxon 39: 326. 1990) consider the type locality to probably be Charleston, South Carolina based on a collection of Bosc, not "Bosch" as erroneously cited by Vahl on the type specimen.

Selected specimens examined: Puerto Rico: Carolina: Punta Cangrejos, *Stevenson & Johnston 1707* (US); *Stevenson 5477* (US). Manatí: Bo. Tierras Nuevas Saliente, *Proctor & Thomas 43803* (US). Vega Baja: Tortuguero, *González-Más 2149* (US). Dorado: to Cerro Gordo, Rd. 693, km 13.0, *González-Más 287* (US).

7. Cyperus difformis L., Cent. Pl. 2: 6. 1756. Lectotype: India. Collector unknown (LINN-70.10), designated by G. C. Tucker, Syst. Bot. Monogr. 43 : 50. 1994.

Caespitose annual, (4-) 7-40 (-50) cm tall. Culms loosely tufted, soft, easily compressed, triquetrous, coarsely ribbed on margins, finely veined on sides, dark green, smooth, (0.7-) 1.2-3 mm wide (when flattened). Leaves 2-7, primarily basal and 1-2 lower cauline; sheaths short, 1-2 mm long, dark green; ligule present, well-developed, membranous; blades linear, flattened, often folded proximally, (2-) 7-22 cm × 1.8-4 mm, dark green, essentially smooth on margins and abaxial midvein except for antrorsely scabrous tip, attenuate to apex. Inflorescence a simple or sometimes compound umbel-like corymb of 3-20 orbicular to glomerulate dense heads of spikelets on relatively short rays, or contracted and heads subsessile in an irregularly lobate mass; involucral bracts 2-4, leaf-like, to 22 cm long, the lowermost often erect or ascending, the others horizontal to divergent; primary rays 2-6, several sometimes to 30 cm long, secondary rays (when present) inconspicuous; spikes globose, often irregularly lobate, 7-17 mm in diam., with 20-140 spikelets; spikelets oblong-ovate to lanceolate, (2-) 3-5 (-6) × 0.8-1.2 mm, subcompressed, obtuse at apex, acute at base, with (6-) 12-20 (-30) florets; rachilla unwinged; scales obovate to orbiculate, laterally compressed, 0.6-0.8 × 0.6-0.9 mm, curvate-keeled, dorsally acute, submembranous, lateral nerves indistinct, stramineous to brown-purple, carina 3-nerved, greenish, yellowish, or whitish stramineous, subtranslucent, prolonged beyond the obtuse apex as a short mucro. Stamens 1 or 2, the anthers 0.2-0.4 mm long, short-apiculate; styles 3-branched. Achene trigonous with plane or slightly concave faces, ellipsoid-obovoid, 0.6-0.8 × 0.3-0.4 mm, obtuse at apex, apiculate, cuneate at base, finely reticulate-papillose, light brown or yellowish.

General distribution: Native in the Old World from southern Europe, Africa, Southeast Asia, Malesia, Pacific Islands, and Australia. Naturalized in the southern United States, Hawaiian Islands, West Indies, Mexico, Central America, and Northern South America.

Distribution in Puerto Rico: Wet sandy or clay soils of low marshy areas, pond and lake margins, pastures, rice fields, canals in agricultural areas, roadside ditches, and disturbed areas. Aguada, Arecibo, Bayamón, Caguas, Carolina, Cataño, Ceiba, Dorado, Fajardo, Humacao, Manatí, Maunabo, Mayagüez, Río Grande, San Juan, and Vega Baja.

Selected specimens examined: Puerto Rico: Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10695* (UPRRP, US). Bayamón: Bo. Minillas, along E side of Río Hondo, *Proctor 43555* (US). Caguas: Bo. Bairóa, off Rt. 30 near old Central Santa Juana, *Axelrod & L. Pérez 9479* (US).

Cataño: Bo. Palmas, Rt 5 at El Puente, *Axelrod & Leal 4267* (US). Mayagüez: College of Agriculture, *González-Más 2135* (US). Río Grande: Bo. Zarzal, beyond end of Rd. 968, *Proctor 42671* (US). San Juan: Bo. Hato Rey Norte, *Proctor 43035* (US). Vega Baja: Tortuguero Lake, *Woodbury s.n.* (US).

8. Cyperus digitatus Roxb., Fl. Ind. 1: 209. 1820.
Type: India. *Roxburgh s.n.* (holotype: K).

Coarse rhizomatous perennial, 70-180 cm tall; rhizomes short, thickened and corm-like. Culms solitary or two approximate, erect, stiff and hardened, trigonous or triquetrous proximally, triquetrous distally, often with a medial longitudinal furrow proximally, coarsely and finely ribbed, 4-12 mm wide, smooth or rarely sparsely scabrellate on angles distally, sheathing bases 10-35 mm wide. Leaves 3-5, basal and lower cauline; sheaths elongate, herbaceous, brown to brown-black proximally, pale brown distally, open, with scarious margins, the inner band essentially absent; ligule absent; blades linear-lanceolate, folded or V-shaped proximally, plicate or subflattened distally, spongy-thickened proximally, 60-130 cm × 7-20 mm, antrorsely scabrous on margins and abaxial midvein, attenuate to triquetrous apex. Inflorescence a large, compound or decompound, hemispherical, umbel-like corymb with ascending rays, 14-33 (-38) × 15-30 (-34) cm, with numerous spikes of densely aggregated spikelets; involucral bracts 8-12 (-15), (5-) 9-90 cm × 3-20 mm, leaf-like, plicate, spreading-ascending to horizontal, often purplish brown at base; primary rays 7-10, to 25 cm long, secondary rays to 5 cm long; spikes cylindrical, (2.5-) 3.5-7 (-7.5) × 1-2 (-2.5) cm, with 30-140 spikelets; spikelets linear, compressed-rhombic, 5-11 × 1-1.2 mm, acute at apex, cuneate at base, with 12-30 florets, spreading at right angles to the rachis, appearing serrated along edge due to the spreading scales; rachilla broadly hyaline-winged, the wings light brown, caducous; scales ovate or ovate-elliptic, acutely keeled dorsally, 1.4-2 × 1-1.3 mm, submembranous, laterally weakly 1-2-nerved along carina, light to reddish brown on sides, with 2 dark brown stripes paralleling either side of carina, carina 3-nerved, green, apiculate at the acute to obtuse apex. Stamens 3, the anthers 0.4-0.6 mm long, bluntly apiculate; style 3-branched. Achene subtrigonous with the side facing the rachilla concave and the other faces plane or slightly convex, ellipsoid, oblong-ellipsoid, or ellipsoid-obovoid, 0.8-1 × 0.4-0.5 mm, dorsiventrally compressed, obtuse at apex, short-apiculate, cuneate at base, estipitate, glossy and appearing essentially smooth, indistinctly finely puncticulate, light brown to light grayish brown at maturity.

General distribution: Pantropical; southern United States (Florida, Louisiana, and Texas), West Indies, Mexico, Central America, Africa, East Asia, Malesia, and Australia.

Distribution in Puerto Rico: In wet grounds of marshy areas, pond and lagoon margins, and pastures. Cabo Rojo, Lajas, and Toa Baja.

Selected specimens examined: Puerto Rico: Toa Baja: Bo. Sabana Seca, area S of Rt. 867, near Naval Station, *Axelrod & L. Pérez 9825* (US).

9. Cyperus distans L.f., Suppl. Pl. 103. 1782 [as a new name]; *Cyperus elatus* Rottb., Descr. Icon. Rar. Pl. 37. 1773, non Linnaeus, 1756.
Type: India; Kerala, Malabar. Collector unknown. (holotype: C-Rottb.; isotype: C-Vahl).

Perennial, (20-) 30-115 (-138) cm tall; rhizome very short, corm-like. Culms solitary or sometimes 2-3, trigonous, finely to coarsely ribbed and channeled, smooth, 2-6 mm wide proximally, sheathing bases (4-) 5-15 (-20) mm wide. Leaves 5-7, basal and lower cauline; sheaths cross-veined, pale brown to reddish brown; ligule absent; blades folded or V-shaped proximally, flattened or plicate distally, 20-60 cm × (3-) 5-12 mm, subabruptly acuminate at apex, the margins, mid rib below, and the two lateral veins above antrorsely scabrous. Inflorescence a compound, hemispherical, umbel-like corymb, (6-) 11-26 (-34) cm diam., with numerous spikes at ray tips; involucral bracts leaf-like, (5-) 6-7 (-10), the lower to 70 cm long, 3.5-13.5 mm wide, the uppermost linear to subulate, shorter; primary rays elongate, 6-9, unequal, to 17 cm × 0.5-1.2 (-2) mm, with tubular prophylls prolonged dorsally into 2, long, linear-subulate teeth; secondary rays very short or the spikes sessile; spikes oblong-ovate to broadly ovate, 2.5-3.5 (-4) × 1.5-3 (-4) cm, with 5-30 laxly disposed spikelets; spikelets linear, cylindrical, slightly ascending to divergent, 7-30 (-70) × 0.4-

0.6 mm (to 1.8 mm wide after spreading of mature florets), acuminate at apex, cuneate at base, with (5-) 7-35 (-75) florets; rachilla flattened, zig-zagged, hyaline-winged (wings caducous), persistent; scales elliptic to oblong-elliptic, boat-shaped to obtusely keeled, 1.6-2 × 0.8-1.1 mm, remotely 2-ranked, spreading at maturity, membranous with broad, scarious margins, weakly 1- to 2-nerved on each side along carina, reddish brown on sides, carina 3-nerved, greenish, not prolonged beyond the scarious, obtuse, emarginate apex, at most forming a minute apiculum. Stamens 3, the anthers 0.5-0.7 mm long, apiculate; style 3-branched from just above the base. Achene trigonous with plane or slightly convex faces, ellipsoid-obovoid or oblong to oblong-ellipsoid, 1.2-1.7 × 0.4-0.5 mm, slightly curved on side facing rachilla, acutely narrowed to apiculate apex, cuneate at base, estipitate, minutely reticulate, dark brown at maturity.

General distribution: Cosmopolitan; more common in warmer regions.

Distribution in Puerto Rico and the Virgin Islands: In wet soils of meadows, riverbanks, marshy areas, grassy areas, scrub forests, rocky thickets and clearings in forests, hillsides, agricultural fields, pastures, roadside ditches, and disturbed open areas. Adjuntas, Aguas Buenas, Aibonito, Añasco, Barranquitas, Bayamón, Caguas, Canóvanas, Carolina, Cayey, Ceiba, Cidra, Coamo, Comerío, Culebra, Dorado, Fajardo, Guayama, Guayanabo, Humacao, Las Piedras, Loíza, Maunabo, Maricao, Mayagüez, Naguabo, Patillas, Peñuelas, Ponce, Río Grande, San Juan, Utuado, Vega Alta, Vieques, Villalba, and Yabucoa; St. Croix, St. John, St. Thomas, and Tortola.

Selected specimens examined: Puerto Rico: Adjuntas: near Pico Guilarte, *Liogier 10004* (US). Bayamón: Rd. 2, km 14.6, *González-Más 1126* (US). Canóvanas, *Stevenson* 3004 (US). Cayey: *Sintenis 2376* (US). Coamo: Bo. San Ildefonso, Baños de Coamo, *Proctor 42430* (US); Coamo Springs, *Goll 669* (US). Comerío: Río Hondo, *González-Más 382* (US). Dorado: Rd. 693, km 1.9, *González-Más 1123* (US). Fajardo: Bo. Río Arriba, *Axelrod & Thomas 10724* (UPRRP). Humacao, *González-Más 1352* (US). Las Piedras: Rd. 5, km 26.4, *González-Más 3* (US). Maricao: Maricao Forest near Hatchery, *González-Más 1643* (US). Mayagüez: Buena Vista, *González-Más 850* (US). Naguabo: *González-Más 1359* (US). Ponce: Cotto Laurel, Rd. 14, km 122.2, Bucaná, *González-Más 779* (US). San Juan: Río Piedras, Sabana Llana, Highland Park grounds, *González-Más 1217* (NY), *González-Más 1*214 (US). Yabucoa: Rd. 3, km 96.2, *González-Más 1345* (US). St. Croix: Fountain Valley, *Fosberg 59329* (US). St. John: Bordeaux Mt., *Woodbury 59/6545* (VINPS); Cruz Bay Quarter; Gift Hill, *Acevedo-Rdgz. 5282* (NY, US). St. Thomas: St. Peter, *E.G. Britton & Marble 1223* (US); Signalhill, *Eggers s.n.* (NA). Tortola: *Fishlock, W.C. 60* (US). Road Town to High Bush, *N.L. Britton & Shafer 785* (US).

10. Cyperus eggersii Boeck., Beitr. Cyper. 1: 53. 1888; *Torulinium eggersii* (Boeck.) C. B. Clarke in Urban, Symb. Antill. 2: 56. 1900. Lectotype: Dominican Republic. *Eggers 2627* (B; isolectotype: C), designated by G. C. Tucker, Syst. Bot. Monogr. 43: 181. 1994.

Rhizomatous perennial, often loosely caespitose, 14-65 cm tall; rhizome short, thickened; roots medium to coarse. Culms erect, triquetrous, sometimes trigonous proximally, stiff and hardened, finely ribbed, smooth, pale green, 1.5-3.5 mm wide, sheathing bases 4-18 mm wide. Leaves 3-7, ascending, basal and lower cauline, those at base often with short blades; sheaths elongate, herbaceous, dark brown with pale veins; ligule absent; blades linear, broadly V-shaped proximally just above sheath apex, plicate or sometimes subflattened distally, 14-45 (-60) cm × 3.5-8 (-11) mm, herbaceous, abaxial mid and lateral veins antrorsely scabrous, margins antrorsely scabrous, attenuate to triquetrous tip. Inflorescence a simple to compound, umbel-like corymb with ascending rays, or reduced to a single, essentially sessile, lobate head of spikes, (1.5-) 2.5-14 × (2-) 3.5-18 cm; primary involucral bracts 4-8, leaf-like, greatly exceeding the inflorescence; secondary involucral bracts linear-setaceous; rays 2-8 or absent; spikes ovoid, in lobate heads of (2-) 3 (-4) at ray tips, with 20-60 congested spikelets; spikelets linear, subcylindrical to slightly compressed, 5-15 × 0.8-1.2 (-1.5) mm, with 5-22 florets, the scales spreading with maturing achenes; rachilla wings spongy-thickened, enveloping achene at maturity; scales elliptic to elliptic-obovate, broadly rounded in cross section, 1.7-2.2 (-2.4) × 1-1.5 mm, submembranous, light brown, smooth, laterally 2-3 nerved on each side along carina, carina finely 5-nerved, green,

prolonged beyond the obtuse apex as short mucro. Stamens 3, the anthers 0.3-0.5 mm long, bluntly apiculate; style 3-branched. Achene oblong-obovate, compressed-trigonous, with plane to slightly convex sides, falcate, 1.3-1.5 × 0.4-0.6 mm, obtuse at apex, apiculate, cuneate at base, stipitate, puncticulate, light brown to brown.

General distribution: Southwestern United States, West Indies, Mexico, Central America, and Andean South America.

Distribution in Puerto Rico: In wet sandy soils, often swampy or marshy areas bordering lakes and ponds. Isabela, Manatí, Mayagüez, Quebradillas, San Sebastián, Vega Alta, and Vega Baja.

Note: This plant was included within the circumscription of *Cyperus odoratus* L. by G. C. Tucker (1994). However, *C. eggersii* consistently differs from *C. odoratus* by the dark brown sheaths, lobate heads of spikes with crowded spikelets, and closely overlapping spikelet scales (vs. green to purple-tinged sheaths, laxly disposed spikes, and spikelet scales that overlap, at the most, only the base of the next scale above).

Selected specimens examined: Puerto Rico: Isabela: Bo. Coto, W. bank, estuary of Río Guajataca near its mouth, *Proctor et al. 42358* (US). San Sebastián: Bo. Aibonito, Area Recreativa de Guajataca, *Proctor & Vives 49274* (US). Vega Alta: Bo. Sabana, *Proctor 45794* (NY, US). Vega Baja: Along the shoreline of Laguna Rica near Camp Tortuguero National Guard, off Rt. 687, *Strong et al. 430* (US).

11. Cyperus elegans L., Sp. Pl. 45. 1753. Lectotype: Jamaica. Sloane, *Voy. Jamaica 1: t. 75, f. 1. 1707*, designated by G. C. Tucker & McVaugh in McVaugh, Fl. Novo-Galiciana 13: 292. 1993.

Cyperus viscosus Sw., Prodr. 20. 1788; *Scirpus viscosus* (Sw.) Lam., Tabl. Encycl. 1: 142. 1791. Type: Jamaica. *Swartz s.n.* (holotype: S-Sw. R-1387).

Cyperus confertus sensu Grisebach, Fl. Brit. W. I. 563. 1864, non Swartz, 1788.

Fig. 48. I-K

Caespitose perennial, 20-80 (-105) cm tall; rhizome short, ascending to vertical, 2.6 mm thick. Culms obtusely trigonous to subcylindrical, remotely antrorsely scabrous, 1.5-3.2 (-3.8) mm wide, sheathing bases 5-11 mm wide. Leaves 2-3, primarily basal; sheaths elongate, cross-veined, stramineous or tinged with brown; ligule absent; blades linear, stiffly ascending, thickly herbaceous, inrolled along margins, laterally compressed, channeled towards apex, 6-75 cm × (1.6-) 2-4 (-5) mm (unfolded), often sticky, smooth, soft and spongy proximally, cross-veined distally, coarsely and remotely scabrous on the margins, often bearing pairs or small groups of antrorse and retrorse barbs, long-attenuate to a bristly, somewhat triquetrous apex. Inflorescence a compound, umbel-like corymb with ascending rays, (5-) 7-20 (-26) cm diam.; involucral bracts 5-6, leaf-like, cross-veined, the lowermost one to 75 cm long; primary rays 5-9, unequal, ascending at anthesis, to 22 cm long; secondary rays 1-5, to 5 cm long, ascending at anthesis, becoming reflexed at maturity; spikes in dense clusters or glomerules at ray tips, 7-30 mm diam., with 5-40 palmately disposed spikelets; spikelets ovate, oblong-ovate, or ovate-elliptic, subflattened, 5-22 × (2-) 3-5 (-7) mm, acute at apex, widely cuneate at base, with 6-34 florets; rachilla wingless; scales broadly ovate, obtusely curvate-keeled, 2.2-3.2 × 2-2.8 mm, with 2-3 coarse nerves on each side above the scarious margins, pale green, tinged with reddish brown on sides, sticky near base at maturity, carina 5-nerved, pale greenish, coarsely antrorsely scabrous on carina distally, the apex slightly excurved-cuspidate. Stamens 3, the anthers 0.6-1.2 mm long, apiculate; styles 3-branched from just above the base. Achene trigonous with plane, concave or slightly convex faces, obovoid, 1.3-1.9 × 0.7-1 mm, obtuse to rounded at apex, with thickened margins, short-beaked, narrowly cuneate at base, short-stipitate puncticulate, maturing blackish.

General distribution: Southern United States, Mexico, Nicaragua, South America, and throughout the West Indies.

Distribution in Puerto Rico and the Virgin Islands: Wet, coastal habitats, often in brackish water of swampy or marshy areas, borders of mangroves, pastures, roadside ditches, shallow depressions on limestone, and disturbed areas. Arecibo, Cabo Rojo, Cataño, Guánica, Guayama, Guayanilla, Juana Díaz, Mona Island, Peñuelas, Ponce, Río Grande, Salinas, San Juan, Santa Isabel, and Vega Baja; Anegada, St. Croix, St. John, and St. Thomas.

Selected specimens examined: Puerto Rico: Arecibo: *Sargent 678* (US). Cabo Rojo: Bo.

Boquerón, just NW of village of Boquerón, *Proctor & McKenzie 43765* (US). Cataño: Bo. Palmas, Rt. 5 at El Puente, *Axelrod & Leal 4261* (US). Guayama: Puerto Jobos, Rt. 707, *González-Más 648* (US). Juana Díaz: Rt. 14, *González-Más 775* (US). Mona Island: E of Cabo Noroeste, *Breckon et al. 6124* (US). Peñuelas: Rd. 2, km 10.9, *González-Más 810* (US). Ponce: Rt. 1, Mucadita, *González-Más 764* (US). Salinas: entrance to Rd. 705, km 1, *González-Más 723* (US). San Juan: Bo. Hato Rey Norte, along Kennedy Ave. (Highway 2), *Proctor 43036* (US). Santa Isabel: Rt. 1, km 110.5, *González-Más 757* (US).Vega Baja: Bo. Cabo Caribe, between Los Naranjos and Caño Las Pozas, *Proctor et al. 45594* (US). St. Croix: Bassin Lagoon, *A.E. Ricksecker 59* (US). St. John: Lameshur, *N.L. Britton 605* (US); Coral Bay Quarter; trail to Fortsberg, *Acevedo-Rdgz. 4084* (JBSD, MO, NY, UPR, US, VINPS). St. Thomas: Magens Bay, *E.G. Britton & Marble 1299* (US); Long Cay, *Eggers s.n.* (NA).

12. Cyperus esculentus L., Sp. Pl. 45. 1753. Lectotype: "Habitat Monspelii, inque Italia, Oriente." Bauhin, *Theatr. Botanici, 222, 1658*, designated by Simpson in C. E. Jarvis et al., Regnum Veg. 127: 41. 1993.

Cyperus lutescens Torr. & Hook., Ann. Lyceum Nat. Hist. New York 3: 433. 1836. *Cyperus esculentus* var. *macrostachyus* Boeck., Linnaea 36: 291. 1870. Type: United States; Texas, *Drummond 452* (holotype: NY; isotype: GH).

Cyperus cubensis Steud., Syn. Pl. Glumac. 2: 42. 1854. Type: Cuba. Collector unknown (holotype: probably at P).

Stoloniferous perennial, (20-) 25-70 (-90) cm tall; stolons flexible, slightly spongy, elongate, 1-2 mm thick, sometimes bearing small tubers. Culms solitary, trigonous proximally, triquetrous distally, firm, finely ribbed, smooth, 1.4-3.8 mm wide, sheathing bases 4-14 mm wide. Leaves 6-13 (-23), primarily basal, 1-3 lower cauline; sheaths short, indistinctly cross veined, pale brown; ligule absent; blades V-shaped proximally to plicate distally, (3-) 10-70 (-85) cm long, the lowermost often equaling length of culm, (-2) 3-7 (8.5) mm wide, finely antrorsely scabrous on margins and abaxial midvein, at least distally, attenuate to triquetrous apex. Inflorescence an open, compound, hemispherical, umbel-like corymb, 3.5-14 (-18) × 3-12 (-15) cm, with ascending rays; involucral bracts 3-5 (-7), leaf like, ascending to horizontal, the lowermost 2 generally exceeding the inflorescence, with the lowest one being 7-60 cm long; primary rays 3-11, to 20 cm long, ascending, secondary rays shorter, often not evident; spikes 1 (-3) at ray tips, broadly ovoid to ellipsoid, 18-35 mm in diam., with (3-) 8-40 (-60) spikelets; spikelets linear, subquadrate, (5-) 9-25 (-30) × (1.2-) 1.5-1.8 (-2.3) mm, acuminate at apex, cuneate at base, with (7-) 9-32 florets; rachilla hyaline-winged; scales ovate to elliptic, acutely keeled, 2.7-3.8 (4.2-) × 1.4-2.2 mm, sub-membranous, with 2-3 well-developed lateral nerves evident the length of the scale, light yellowish brown to brown or golden-brown, carina 3-nerved, inconspicuous, greenish, prolonged beyond the obtuse to acute apex as a short, slightly excurved mucro. Stamens 3, the anthers 1.2-2 mm long, apiculate; styles 3-branched. Achene trigonous with the adaxial face slightly concave and the abaxial faces plane or slightly convex, ellipsoid to oblong-ellipsoid or ellipsoid-obovoid, (1-) 1.3-1.6 × 0.3-0.8 mm, obtuse at apex, short-cuneate at base, short-apiculate, estipitate, puncticulate-reticulate, glossy, grayish brown to brown.

General distribution: A cosmopolitan weed; in temperate and tropical regions; often cultivated.

Distribution in Puerto Rico and the Virgin Islands: In waste areas, gardens, pastures, lawns, and other disturbed habitats. Carolina, Dorado, Fajardo, Guayama, Mayagüez, Río Grande, Quebradillas, San Juan, Toa Baja, and Vieques; Anegada and St. Thomas.

Common name: Puerto Rico: *Chufas.*

Note: This species is closely related to *Cyperus rotundus* L., but can be distinguished from it by its light brown or yellowish brown spikelet scales with 2-3 well-developed lateral nerves evident the length of the scale (vs. dark reddish brown to purple-brown or blackish scales that have 1-2 indistinct lateral nerves evident only at proximal base of scale, the sides smooth for the most part); and longer inflorescence bracts, the lowermost 2 generally exceeding the inflorescence, with the lowest one being 7-60 cm long (vs. all bracts generally shorter than to equaling or only the lowest shortly exceeding the inflorescence, 1-9 (-14) cm long).

Selected specimens examined: Puerto Rico: Guayama: On road from Guayama to Aguirre, *Underwood & Griggs 379* (US). Toa Baja: Palo Seco, *Hioram 809* (US). Vieques Island: Near terminal building, *Proctor 46586* (US). Anegada: The Settlement, *Proctor & Haneke 45978* (US).

13. Cyperus filiformis Sw., Prodr. 20. 1788. *Torulinium filiforme* (Sw.) C. B. Clarke in Urban, Symb. Antill. 2: 57. 1900. Type: Jamaica. *Swartz s.n.* (holotype: C, no. R-1385; isotype: B-Willd. 1292).

Caespitose perennial, 6-48 (-60) cm tall; rhizome short, knotty, branching horizontally. Culms loosely tufted, firm but flexuous, often arching, very slender, triquetrous with obtuse angles, angles sometimes antrorsely scabrous just below inflorescence, finely ribbed, smooth, 0.3-1 mm wide. Leaves 1-3, basal and lower cauline, the lowermost with short blades or bladeless; sheaths short, brown or purplish brown, inner band membranous or thinly herbaceous, with truncate to slightly convex orifice; ligule absent; blades narrowly linear, plicate, 3-40 cm × (0.5-) 1-2.3 mm, semi-glossy and cellular-reticulate adaxially, antrorsely scabrous on the margins and abaxial midvein towards apex, smooth below, acuminate to triquetrous apex. Inflorescence a terminal corymb, 1.2-5 × 0.7-3 cm, or reduced to 2-6 subfastigate spikelets; involucral bracts 1-3, leaf-like, the lowest well-developed, erect and appearing as a continuation of the culm, exceeding the inflorescence, upper bracts setaceous; rays 1-3, often inconspicuous, sometimes elongating up to 4 cm; spikes 1-3, loose, obconic, 12-30 × 7-20 mm, with 1-6 spikelets; spikelets linear-subulate, subterete, (8-) 10-30 × 0.8-1.2 mm, acuminate at apex, cuneate at base, with 4-13 florets; rachilla flexuose, broadly winged, with coriaceous wings that clasp the achene at maturity; scales ovate-elliptic, dorsally obtuse to rounded, 2.5-3.5 × 1.7-2 mm, thickly herbaceous to subcoriaceous, with 5-7 nerves on each side above the scarious margins, stramineous to yellowish or reddish brown, dark reddish lineolate, carina 3-nerved, green, prolonged at subobtuse apex as a short mucro Stamens 3, the anthers 0.4-0.6 mm long, truncate-apiculate or sometimes 2-lobed at tip; styles 3-branched. Achene trigonous with plane to slightly concave faces, oblong-obovate, curvate on adaxial side, 1.3-1.9 × 0.5-0.8 mm, abruptly narrowed to an obtuse apex, apiculate, sub-rounded at base, short-stipitate, puncticulate, brown to dark brown or grayish brown at maturity.

General distribution: Endemic to the West Indies.

Distribution in the Virgin Islands: Moist sandy, gravelly, or rocky hillsides and road banks. St. Croix and St. Thomas.

Selected specimens examined: St. Thomas: *Eggers 77* (US); *Eggers* s.n. (NA, US); *Vélez 30175* (US).

14. Cyperus flavescens L., Sp. Pl. 46. 1753. *Pycreus flavescens* (L.) P. Beauv. ex Rchb., Fl. Germ. Excurs. 72. 1830. Lectotype: *Herb. Burser 1: 81* (UPS), designated by Kukkonen in Cafferty & C. E. Jarvis (ed.), Taxon 53: 178. 2004.

Slender annual, (6-) 10-30 (-40) cm tall. Culms densely tufted, slender, soft, flexuous, triquetrous, finely ribbed, smooth, 0.4-1.3 mm wide. Leaves 2-4 per culm, basal and lower cauline; sheaths purple-tinged to purple-brown proximally, pale green distally; ligule absent; blades narrowly linear, V-shaped or folded proximally, flattened to subplicate distally, 3-20 cm × 0.5-2 (-2.2) mm, antrorsely scabrous on the margins and abaxial midvein, at least distally, attenuate to triquetrous apex. Inflorescence a simple, umbel-like corymb with few rays, often reduced to a single spike, 1-7 cm in diam.; involucral bracts 2-3, leaf-like, spreading, the lowermost to 15 cm long; rays not evident or 1-3, short, to 4 cm long; spikes widely ovoid to subglobose, 1-4 cm diam., with 4-25 (-30) spikelets; spikelets strongly laterally flattened, oblong to oblong-lanceolate, 4-12 × 2-2.5 mm, excluding the denuded rachilla, subacute at apex, obtuse at base, with (8-) 12-24 (-40) florets; rachilla 4-angled, unwinged; scales ovate to ovate-elliptic, narrowly acute dorsally, curvate-keeled, 1.5-2 × 1-1.6 mm, submembranous, with 1 nerve on each side bordering carina, the sides essentially nerveless above the narrowly scarious margins, light yellowish brown, carina 3-nerved, greenish, ending in a short cusp at the broadly acute apex. Stamens 2 or sometimes 3, the anthers 0.4-0.5 mm long, bluntly apiculate; styles 2-branched. Achene thickly biconvex, orbicular-obovate, 0.8-1 × 0.5-

0.7 mm, sub-rounded to rounded at apex, often asymmetrically so, apiculate, abruptly cuneate at base, stipitate, transversely rugulose-reticulate, often inconspicuously so, with fine transverse often whitish undulations that sharply contrast with the brown to black color of the achene.

General distribution: Cosmopolitan; in temperate and tropical regions.

Distribution in Puerto Rico: In wet habitats including seepages, marshy areas, swales, and ditches. Bayamón, Cidra, Dorado, and Río Grande.

Selected specimens examined: PUERTO RICO: Bayamón: *Hioram 359* (US). Dorado: *N.L. Britton & E.G. Britton 7534* (US). Río Grande: Sierra de Luquillo, *Proctor 42281* (US).

15. Cyperus flexuosus Vahl, Enum. Pl. 2: 359. 1805; *Torulinium flexuosum* (Vahl) T. Koyama, Phytologia 29: 74. 1974; *Diclidium vahlii* Schrad. ex Nees in Martius, Fl. Bras. 2: 53. 1842, *nom. illeg.*; *Cyperus vahlii* Steud., Syn. Pl. Glumac. 2: 48. 1854, *nom. illeg.*; *Torulinium vahlii* C. B. Clarke in Urban, Symb. Antill. 2: 56. 1900, *nom. illeg.* Type: St. Croix, U.S. Virgin Islands. *von Rohr 173* (holotype: C-Vahl; photo at F and US).

Cyperus ehrenbergii Kunth, Enum. Pl. 2: 89. 1837. Lectotype: St. Thomas, U.S. Virgin Islands. *Ehrenberg 77* (HAL), here designated.

Cyperus insignis Kunth, Enum. Pl. 2: 92. 1837. *Cyperus flexuosus* var. *insignis* (Kunth) Kük. in Engler, Pflanzenr. IV. 20 (Heft 101): 622. 1936. Type: Guadeloupe. *Bertero s.n.* (holotype: probably at TO or P; isotype: B, destroyed).

Rhizomatous perennial, 20-90 cm tall; rhizome short, subbulbous, woody, 7-15 mm thick. Culms 1 to several, trigonous proximally to obtusely triquetrous distally, smooth, 2.5-4.5 mm wide near base, sheathing bases 0.6-1 cm wide. Leaves 4-8, all basal; sheaths short, cross-veined, light brown, purplish proximally; ligule absent; blades linear, flattened, 14-45 cm × 4.5-11 mm, remotely antrorsely scabrous on margins, smoothish on midvein beneath, long-acuminate to triquetrous apex. Inflorescence a simple or compound umbel-like corymb with ascending rays, (2-) 5-25 cm diam.; involucral bracts 7-8, elongate, leaf-like, 3-51 cm long; rays 8-10, to 14 cm long; spikes 1-7 at ray tips, widely ovate to rounded, 1.6-3.5 × 1.3-3 cm, with 30-80 spikelets; spikelets linear, subcylindrical, 0.5-2 cm × 0.8-1.1 mm, spicate or sometimes radiate, somewhat congested, with the internodes of the rachis between spikelets less than 1 mm, the lower ones reflexed at maturity, with 3-12 florets, disarticulating at base and rachilla nodes; rachilla with broad scarious wings, these at maturity becoming thick and corky, yellowish to brown, enveloping the achene, the rachilla node and flower falling together; scales ovate to elliptic-ovate, somewhat dorsally compressed, dorsally rounded to broadly so, inrolled along margins, 2.3-3.5 × 2.0-2.5 mm, obscurely 1-2 nerved on each side bordering carina above the narrowly scarious margins, thickly membranous to subcoriaceous, chestnut-colored, shiny, reddish brown to dark brown on sides, carina finely 5- to 7-nerved, green, extending as a short, prickly-tipped mucro below the obtuse apex. Stamens 3, the anthers 0.5-1 mm long, bluntly apiculate; styles 3-branched. Achene trigonous with plane to slightly convex faces, oblong-obovoid, dorsiventrally compressed, 1.2-1.9 × 0.5-0.7 mm, slightly falcate at maturity, narrow acutely to short-beaked apex, cuneate at base, estipitate, minutely puncticulate, light brown to brown at maturity.

General distribution: West Indies, Mexico, and Brazil.

Distribution in the Virgin Islands: Wet or moist soils of roadside ditches. St. John and St. Thomas.

Note: Reported for Puerto Rico (Culebra Island) by Axelrod (Caribbean J. Sci. 29: 126: 1993), based on *Axelrod et al. 1695* (UPRRP; xerox at US), but that specimen is *Cyperus planifolius* Rich.

Selected specimens examined: ST. JOHN: Lameshur, *N.L. Britton & Shafer 623* (US); Reef Bay Quarter; along new road from Bordeaux Road to Coral Bay, *Acevedo-Rdgz. & Siaca 3799* (MO, NY, US). ST. THOMAS: St. Peter, *E.G. Britton & Marble 1224* (US).

16. Cyperus floridanus Britton in Small, Fl. s.e. U.S. 170. 1903; *Mariscus floridensis* C. B. Clarke, Bull. Misc. Inform. Kew Addit. Ser. 8: 20. 1908, *nom. illeg.* Type: United States; Florida, Key West. *Blodgett s.n.* (holotype: NY; fragment at US!).

Cyperus filiformis var. *densiceps* Kük., Repert. Spec. Nov. Regni Veg. 23: 190. 1926.

Lectotype: Cuba; Oriente. *Ekman 7803* (NY!; isolectotype fragment: US), here designated.

Cyperus kingsii C.D. Adams ex Proctor, Sloanea 1: 1. 1977. Type: Cayman Islands; Grand Cayman. *W. Kings GC410* (holotype: BM).

Caespitose perennial, 2-30 cm tall; rhizome short, knotty. Culms erect or sometimes reclining, obtusely trigonous, filiform, wiry, 0.3-0.8 mm wide, finely ribbed and often coarsely channeled on sides, smooth, sheathing bases 0.8-1.8 mm wide. Leaves primarily basal, 1-2 lower cauline, often equaling to overtopping culms; sheaths short, light brown to brown, the veins often reddish; ligule absent; blades U-shaped, V-shaped, or often involute and appearing filiform, 0.5-30 cm × 0.2-1.2 mm, finely veined abaxially, subglossy and cellular-reticulate adaxially, smooth to remotely antrorsely scabrous on the margins, attenuate to triquetrous apex. Inflorescence a narrowly hemispherical, terminal cluster of 1-5, short-peduncled spikes, appearing pseudolateral, the lowest bract erect, appearing as a continuation of the culm, 5-15 mm in diam.; involucral bracts 2-4, leaf-like, the lowermost one to 20 cm long; rays short, essentially absent; spikes with 4-16 densely disposed spikelets; spikelets linear-subulate, 3-14 (-17) × 0.5-1 (-1.5) mm, the scales widely spreading with maturing achenes, acute at apex, narrowly cuneate at base, with 5-16 florets; rachilla with hyaline wings; scales ovate-elliptic, dorsally obtuse, slightly falcate-spreading, concavely curvate-keeled or keel straight, 1.4-2.2 × 0.8-1.2 mm, herbaceous to thickly so, with 4-5 nerves on each side above the narrowly scarious margins, maroon, carina 3-nerved, green, prolonged beyond the obtuse apex as a short mucro. Stamens 3, the anthers 0.3-0.5 mm long, bluntly apiculate; style 3-branched. Achene trigonous, slightly curvate, with adaxial face concave and adaxial faces plane, linear-oblong, 1.3-1.6 × 0.4-0.6 mm, short-apiculate, obtuse to sub-rounded at base, estipitate, puncticulate, brown to dark brown or brown-black.

General distribution: Southern United States (Florida) and the West Indies.

Distribution in Puerto Rico: Soil-filled depressions on limestone. Guánica and Mona Island.

Selected specimens examined: Puerto Rico: Guánica: San Jacinto Beach, *González-Más 966* (MAPR). Mona Island: between Uvero and Bajura de los Cerezos, *Proctor & Haneke 43147* (SJ).

17. Cyperus fuligineus Chapm., Fl. South. U. S. 511. 1860; *Mariscus fuligineus* (Chapm.) C. B. Clarke in Urban, Symb. Antill. 5: 290. 1907. Type: United States; Florida, Key West. *Chapman s.n.* (holotype: NY!; fragment at US!).

Caespitose perennial, 7-40 cm tall; rhizome short, knotty. Culms slender but somewhat stiff, firm, thickened at base, obtusely trigonous, finely ribbed, channeled medially on sides, smooth, 0.6-1.5 mm wide, sheathing base of culm 1-3 mm wide. Leaves 2-6, primarily basal, 1-2 lower cauline; sheaths short, to 5 cm long, the lower bladeless or nearly so, dark red, reddish purple or purple-brown, the orifice truncate, often with a cleft medially; ligule absent; blades linear, V-shaped to subplicate, sometimes folded, stiffish and incrassate proximally, slightly revolute-margined, 0.5-21 cm × (1-) 1.3-3 (-3.5) mm, finely veined abaxially, faintly veined or smooth and semi-glossy adaxially, antrorsely scabrous on the margins and abaxial midvein, at least distally, attenuate to triquetrous apex. Inflorescence a spherical or hemispherical, head-like or lobate corymb of 8-50 (-70) radiate spikelets, 0.8-2 cm in diam.; involucral bracts 2-3, leaf-like, ascending to divergent, often reflexed at maturity, the lowermost one elongated, greatly exceeding the inflorescence, to 12 cm long; spikes indistinct; spikelets elliptic-lanceolate to oblong-lanceolate, subcompressed, 4-10 × 1-1.5 (-2) mm, acute to acuminate at apex, short-cuneate at base, with 6-16 florets; rachilla narrowly hyaline-winged; scales ovate to broadly ovate, dorsally obtuse, or acute when immature, 1.6-2.1 × 1.2-1.6 mm, chartaceous, semi-glossy, lineolate adaxially, with 4-5 coarse nerves on each side above the narrowly scarious margins, light yellowish brown and tinged with red-brown, uniformly dark reddish brown, or purple black distally, carina relatively broad, obscurely 3-nerved, greenish, prolonged beyond the obtuse to sub-rounded apex as a short, scabrous mucro. Stamens 3, the anthers 0.3-0.7 mm long, bluntly apiculate; style 3-branched. Achene triquetrous or with the 2 abaxial faces plane, ellipsoid-obovoid to oblong-obovoid, 1-1.3 × 0.5-0.8 mm, apiculate, short-cuneate at base, estipitate, puncticulate, maturing black.

General distribution: Southern United States (Florida) and the West Indies.

Distribution in Puerto Rico and the Virgin Islands: Growing in depressions of dry limestone rock in coastal areas. Cayo Icacos; Anegada.

Selected specimens examined: ANEGADA: West End, *N.L. Britton & Fishlock 951* (US).

18. Cyperus giganteus Vahl, Enum. Pl. 2: 364. 1805. Type: Puerto Rico. *West s.n.* (holotype: C-Vahl, photo at F, US; isotypes: B, C, fragment at US!).

Papyrus comosus Kunth in Humb., Bonpl., & Kunth, Nov. Gen. Sp. 1 [quarto ed.]: 218. 1816; *Cyperus comosus* (Kunth) Poir. in Lamarck, Encycl. Suppl. 5. 185. 1817, non Sibthorp & Smith, 1806; *Cyperus giganteus* var. *comosus* (Kunth) Kük., Repert. Spec. Nov. Regni Veg. 32: 74. 1933. Type: Ecuador; Guayaquil. *Humboldt & Bonpland 3803* (holotype: P-HBK).

Coarse rhizomatous perennial, 2-4 m tall; rhizomes indurate, scaly, 1-6 cm thick, to 30 cm long; roots coarse. Culms approximate, erect, firm, with a whitish pith, somewhat spongy and subterete proximally, obtusely trigonous distally, very finely striate, smooth, (0.6-) 0.8-3 cm wide, sheathing bases 1-5 cm wide. Leaves 4-6, basal and lower cauline, reduced to bladeless sheaths, dorsally acute to acuminate; sheaths eligulate, elongate, herbaceous, glossy adaxially, open, with scarious red-speckled margins, the inner band essentially absent, brown. Inflorescence a large, decompound, hemispherical, umbel-like corymb with ascending rays, (17-) 20-54 × (13-) 18-32 cm, with numerous spikes of densely aggregated spikelets; primary involucral bracts (6-) 8-13 (-15), 4-45 cm × 4-22 mm, linear-lanceolate, flattened to plicate, spreading-ascending to horizontal, glabrous except for antrorsely appressed-strigose edges of blade both abaxially and adaxially, the margins and abaxial midvein antrorsely scabrous, at least distally, gradually and narrowly acuminate at apex; primary rays 7-25, to 32 cm long, secondary rays 5-7, to 18 cm long; spikes cylindrical, 1.5-4 × 0.7-1.7 cm, with 24-130 spikelets; spikelets linear-lanceolate, subcompressed, 3-9 (-11) × 0.8-1.2 mm, acute to acuminate at apex, cuneate at base, with 6-19 florets; rachilla wings light brown, caducous; scales ovate-elliptic, dorsally obtuse, 1.3-2.2 × 1-1.5 mm, submembranous, laterally nerveless, light to reddish brown on sides, margins scarious, carina 5- to 7-nerved, light green to dark green, prolonged beyond the acute to obtuse apex as a slightly excurved mucro. Stamens 3, the anthers 0.6-1 mm long, with a blackish, papillate, subulate-tipped apex; style 3-branched. Achene subtrigonous with the side facing the rachilla concave and the other faces convex, oblong, dorsiventrally compressed, 0.9-1.2 × 0.4-0.5 mm, obtuse at apex, scarcely to short-apiculate, sub-rounded at base, estipitate, puncticulate, stramineous to pale brown or light reddish brown at maturity.

General distribution: Southern United States (Louisiana and Texas), eastern Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico: In water or wet grounds along streams and creeks, riverine intertidal zones, swales, swampy or marshy areas, drainage canals, pond margins, roadside ditches, and waste areas. Aguas Buenas, Añasco, Bayamón, Cataño, Cidra, Dorado, Loíza, Mayagüez, Río Grande, San Juan, Toa Baja, Vega Alta, and Yabucoa.

Common name: Puerto Rico: *Junco de ciénaga.*

Selected specimens examined: PUERTO RICO: Añasco: *Sintenis 5621* (US). Bayamón: *Johnston 913* (US). Cataño: Bo. Palmas, *Axelrod & Díaz 12735* (UPRRP). Cidra: Pueblo Viejo, *Stevenson 554* (US). Dorado: Rd. 165, *González-Más 259* (US). Loíza: At km 2.8 to Loíza on Rt. 951, *Howard et al. 15943* (US). Mayagüez, *Sintenis 1217* (US). Río Grande: Bo. Herreras, Rd. 187, *Proctor & Rivera 48357* (US). Yabucoa: *Sintenis 4941b* (US).

19. Cyperus haspan L., Sp. Pl. 45. 1753. Lectotype: India. *Herbarium Hermann* 2: 43, No. 37 (BM), designated by McGivney, Catholic Univ. Amer., Biol. Series 26(1-17) : 45. 1938.

Cyperus juncoides Lam., Tabl. Encycl. 1: 147. 1791. *Cyperus haspan* subsp. *juncoides* (Lam.) Kük., Repert. Spec. Nov. Regni Veg. 23. 184. 1926. Type: North America. Collector unknown (holotype: P-Lam.).

Rhizomatous perennial, 20-132 (-180) cm tall; rhizome short, horizontally creeping, 2-6 mm thick. Culms forming in a row along the rhizome at short intervals, triquetrous to nearly 3-winged,

soft and friable, easily compressed, closely and finely ribbed, smooth, (1-) 1.8-5 (-5.5) mm wide, sheathing bases 3-8 mm wide. Leaves reduced to bladeless sheaths or occasionally 1-3 blades present, basal and lower cauline; sheaths thinly herbaceous, subtranslucent, reddish or purplish, finely and closely veined with dark red veins, the bladeless ones oblique at orifice, the blade-bearing ones with a convex to truncate orifice; ligule absent; blades when present, linear, flattened, V-shaped, or often folded (at least proximally) and appearing unifacial, 1-20 (-30) cm × 2-8 (-10) mm, essentially smooth on margins proximally, antrorsely scabrous distally, attenuate to triquetrous apex. Inflorescence a compound, open or contracted, umbel-like corymb with ascending rays, (3-) 4-15 cm in diam.; involucral bracts 2 (-3), leaf-like, ascending to horizontal, to 18 cm long, rarely the lowermost overtopping the inflorescence; primary rays 5-16, ascending, short to elongate and up to 20 cm long, secondary rays sometimes present, to 15 mm long; spikes hemispherical or rounded, with subdigitately clustered spikelets, 8-20 mm in diam., with (1-) 3-13 spikelets; spikelets linear-lanceolate to linear, 3-18 × 1-1.6 (-2) mm, compressed, acuminate at apex, short-cuneate at base, with 7-23 (-31) florets; rachilla unwinged; scales oblong-ovate, dorsally acute, 1.4-1.9 × 0.8-1 mm, submembranous, with 1 nerve on each side above the narrowly scarious margins, reddish to greenish brown or stramineous on sides, carina 1-nerved, greenish, prolonged as a short prickly mucro at the subacute apex. Stamens 3, the anthers 0.3-0.6 mm long, often with a tuft of minute crystalline trichomes at apex; style 3-branched. Achene trigonous to very obtusely so, with convex faces, subglobose to obovoid or broadly ellipsoid, 0.5-0.8 × 0.3-0.5 mm, obtuse to acute at apex, apiculate to entire, cuneate at base, with small basal torus, granular to papillose, lustrous-white or pale brown, sometimes reddish brown.

General distribution: Pantropical.

Distribution in Puerto Rico: In wet or saturated sandy soils along roadsides, ditches, pastures, grasslands, pond borders, marshy areas, and waste places. Canóvanas, Carolina, Cayey, Ceiba, Cidra, Dorado, Guayama, Humacao, Luquillo, Manatí, Mayagüez, Naguabo, Río Grande, San Juan, San Sebastián, Utuado, Vega Alta, and Vega Baja.

Selected specimens examined: Puerto Rico: Canóvanas: Sierra de Luquillo, *Proctor & Taylor 46298* (US). Carolina: Lago San José, *Hioram 229* (US). Cayey: Sierra de Cayey, Carite Forest, *Proctor & Milety 43962* (US); Guavate State Forest, *Liogier 10359* (US). Humacao: Pozal, Playa de Humacao, *Eggers 707* (US). Mayagüez: Las Mesas, *Holm 222* (US). Naguabo: Sierra de Naguabo, Río Icaco and adjacent hills, *Shafer 3469* (US); Río Grande: Sierra de Luquillo, Carribean National Forest, *Proctor & Thomas 43198* (US). San Juan: Martín Peña, *Stevenson 539* (US). Río Grande: El Yunque, *Sargent 304* (US). San Sebastián, *Sargent 245* (US). Utuado, *Sargent 3277* (US).

20. Cyperus imbricatus Retz., Observ. Bot. 5: 12. 1788. Type: India. *Koenig s.n.* (holotype: LD; isotype: C).

Cyperus radiatus Vahl, Enum. Pl. 2: 369. 1805. Lectotype: Africa; Guinea. 1784, *Isert s.n.* (C-Vahl), designated by G. C. Tucker & McVaugh in McVaugh, Fl. Novo-Galiciana 13: 304. 1993.

Cyperus radiatus var. *elongatus* Boeck., Linnaea 36: 317. 1870. *Cyperus imbricatus* var. *elongatus* (Boeck.) Kük. in Engler, Pflanzenr. IV. 20 (Heft 101): 71. 1936. Type: Philippine Islands. *Cuming 437* (holotype: B, destroyed).

Coarse, rhizomatous perennial, 70-150 cm tall; rhizomes short, 1-3 cm long, 5-10 mm thick, hardened; roots coarse. Culms erect, trigonous, often subtriquetrous distally, firm, coarsely ribbed, smooth, (3-) 3.5-10 mm wide, sheathing bases 1-3 cm wide. Leaves 3-7, basal and cauline; sheaths eligulate, spongy-thickened and purple-black proximately, fading to brown streaked with black distally; ligule absent; blades linear, folded to V-shaped proximally, plicate distally, 35-90 cm × 4-15 (-18) mm, with numerous cross veinlets, antrorsely scabrous on the margins, abaxial midvein, and adaxial lateral veins, long-attenuate to triquetrous apex. Inflorescence a compound umbel-like corymb with ascending rays, 12-30 × 14-30 (-40) cm; involucral bracts 5-10, leaf-like, spreading, ascending to horizontal, the lowermost to 90 cm long; rays 6-12, to 25 cm long; spikes linear-cylindric, 1-6 (-8) cm × 3-10 (-15) mm, in subradiate groups of (1-) 3-20 at ray tips, with (20-) 30-130 (-160) densely disposed spikelets;

spikelets ascending initially, divergent with age, ovate-lanceolate to oblong-lanceolate, compressed, often slightly twisted, 3-6 × 1-1.4 mm, acute to obtuse at apex, obtuse at base, with 8-22 florets; rachilla unwinged; scales ovate, 1-1.3 (-1.5) × 0.7-1 mm, dorsally obtuse, submembranous, with 2-3 indistinct nerves on each side above the scarious margins, stramineous to yellowish or reddish brown, carina 3-nerved, greenish, prolonged beyond the obtuse to sub-rounded apex, as a short, straight to slightly excurved mucro. Stamens 3, the anthers 0.2-0.5 mm long, apiculate; styles 3-branched. Achene trigonous, dorsiventrally compressed, with the adaxial face plane and the abaxial faces broadly rounded, ellipsoid to ellipsoid-obovoid, 0.5-0.6 × 0.3-0.4 mm, obtuse to sub-rounded at apex, apiculate, sub-rounded at base, short-stipitate, very finely puncticulate to essentially smooth and glossy at maturity, dull whitish to stramineous.

General distribution: Cosmopolitan; more common in warmer regions.

Distribution in Puerto Rico: In wet or saturated soils of low, swampy habitats, lake margins, edges of rivers and canals, old fields, roadsides, lawns, and disturbed areas, often emergent. Aguada, Aibonito, Añasco, Bayamón, Carolina, Cataño, Guayama, Humacao, Mayagüez, Naguabo, Quebradillas, San Juan, San Sebastián, Trujillo Alto, Vega Alta, and Vega Baja.

Selected specimens examined: PUERTO RICO: Aguada: *Sargent 567* (US). Añasco: *Heller* 4536 (US). Bayamón: Bo. Minillas, along E side of Río Hondo, *Proctor 43553* (US). Carolina, *Stevenson & Johnston 1390* (US). Humacao: Playa de Humacao, *Eggers 682* (US). Mayagüez, *Sintenis 126* (US). Vega Alta: Bo. Sabana, ca. 1.8 km due NE of jct. Rds. 690 and 691, *Proctor 45087* (US).

21. Cyperus involucratus Rottb., Descr. Pl. Rar. 22. 1772; *Cyperus flabelliformis* Rottb., Descr. Icon. Pl. Rar. 42. 1773, *nom. illeg.*; *Cyperus alternifolius* subsp. *flabelliformis* (Rottb.) Kük. in Engler, Pflanzenr. IV. 20 (Heft 101): 193. 1936. Lectotype: Arabia. *Forsskål s.n.* (holotype: C-Rottb.), designated by Baijnath, Kew Bull. 30: 522. 1975.

Cyperus alternifolius of many authors, non Linnaeus, 1771.

Coarse, rhizomatous perennial, 45-200 cm tall; rhizomes horizontally creeping, stout, 10-20 mm thick, woody. Culms solitary, crowded to narrowly spaced and forming in a row along the rhizome, erect, trigonous to obtusely trigonous or subterete proximally, finely ribbed, smooth, sometimes scabrid at apex, 3-9 mm wide, sheathing bases 7-23 mm wide. Leaves basal and lower cauline, reduced to bladeless sheaths; upper sheaths elongate, pale green, obliquely truncate at orifice, dorsally acute at apex, the lower cataphylloid, yellow-brown or brown. Inflorescence a compound umbel-like corymb with ascending rays, 5-16 × 5-25 (-30) cm; involucral bracts 12-25, foliaceous, linear-lanceolate, flattened, 9-30 (-35) cm × (2-) 4-18 mm, subequal in length, horizontally spreading, appearing spirally disposed, antrorsely scabrous on the margins and abaxial midvein, abruptly acute to acuminate at apex; primary rays 9-16, to 20 cm long, secondary rays 7-12, to 30 mm long; spikes in subglobose or lobate clusters, 7-20 (-30) mm in diam., disposed in digitate clusters of 7-35 spikelets at ray tips; spikelets ovate to lanceolate or oblong-lanceolate, strongly compressed, 4-10 × 1.8-2.2 mm, acute at apex, short-cuneate at base, with 8-34 florets; rachilla unwinged; scales ovate-deltate, 1.6-2.4 × 1.2-1.7 mm, obtusely curvate-keeled, bicarinate basally, membranous and translucent, lateral nerves indistinct above the scarious margins, whitish stramineous or light brown to brown on sides proximally, carina 3-nerved, light brown, prolonged beyond the acute apex as a short mucro,. Stamens 3, the anthers 0.7-1 mm long, with prolonged subulate, papillose apex; style 3-branched. Achene plano-convex to subtrigonous, with the adaxial face plane or slightly convex and the abaxial faces convex, broadly ellipsoid, 0.6-0.8 × 0.4-0.6 mm, short-apiculate at obtuse apex, sessile or short-stipitate at abruptly cuneate base, puncticulate, brown.

General distribution: Native to Arabia and tropical East and South Africa; escaping cultivation and naturalized in the New World from the southern United States (Florida, Louisiana, Texas, Arizona, and southern California) Hawaii, West Indies, Mexico, Central America, South America, and in the Old World tropics.

Distribution in Puerto Rico and the Virgin Islands: Wet areas of creek and stream borders, riverbanks, swampy areas, pond margins, small pools, secondary forest, roadside ditches, fields, pastures, and disturbed areas. Cultivated and often used as an ornamental, naturalized. Adjuntas,

Aibonito, Arecibo, Cayey, Coamo, Guánica, Guayama, Guayanilla, Naguabo, Isabela, Jayuya, Juana Díaz, Maricao, Mayagüez, Naguabo, Peñuelas, Ponce, San Germán, Santa Isabel, San Juan, Río Grande, Trujillo Alto, Utuado, Vega Baja, and Yauco; St. Croix, St. John, and St. Thomas.

Common name: Puerto Rico: *Paragüita.*

Selected specimens examined: PUERTO RICO: Adjuntas: Rd. 10, km 23.5, along creek, *González-Más 875* (US). Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10728* (MAPR, NY, UPRRP, US). Guayanilla: Rd. 336, *González-Más 813* (US). Jayuya: Toro Negro Forest Reserve, *Acevedo-Rdgz. & Angell 9443* (FTG, NY, UPR, UPRRP, US). Mayagüez: Guanajibo, *González-Más 822* (US). Naguabo: Bo. Río, along estuary of the Río Blanco, *Proctor & Rodriguez 42847* (US). San Juan: Río Piedras, *Stevenson 5115* (US). Utuado: Vicinity of Utuado, *N.L. Britton & Cowell 902* (US). Yauco: banks of Río Loro, *Sargent 669* (US). ST. THOMAS: Raphune, *Acevedo-Rdgz. 11347* (NY, UPRRP, US).

22. Cyperus iria L., Sp. Pl. 45. 1753. Lectotype: India. *Osbeck s.n.* (LINN-70.16), designated by G. C. Tucker, Syst. Bot. Monogr. 43: 91. 1994.

Caespitose annual or short-lived perennial, (5-) 12-60 (-75) cm tall. Culms erect, loosely caespitose, triquetrous, stiff and hardened, ribbed, smooth, (1-) 1.2-3 mm wide, sheathing bases (2-) 3-6 (-8) mm wide. Leaves (1-) 3-5, basal and lower cauline; sheaths elongate, pale green to pale brown, the lowermost reddish tinged, reddish lineolate; ligule absent; blades linear, V-shaped proximally, subflattened to plicate distally, (3-) 8-30 (-40) cm × (1.5-) 2-6 mm, antrorsely scabrous on the margins and abaxial midvein, at least distally, attenuate to triquetrous apex. Inflorescence a simple to compound umbel-like corymb with ascending rays, 2.5-15 (-19) × 2.5-18 cm; involucral bracts (3-) 4-8 (-9), leaf-like, ascending to spreading, to 2-40 (-50) cm long; primary rays 4-8, to 12 cm long, secondary lateral rays absent or very short; spikes oblong to narrowly ovoid, 2-6 (-8) at ray tips, 1-5 cm × 2.2-11 (-15) mm, with 5-26 (-30) loosely disposed spikelets; spikelets linear-lanceolate, compressed, 4-12 (-20) × 1.5-2 mm, obtuse at apex, short-cuneate at base, with 6-22 (-26) florets; rachilla unwinged; scales broadly elliptic to elliptic-obovate or subrounded, 1.3-1.8 × 1.2-1.8 mm, dorsally acute, curvate-keeled, submembranous, with 1 lateral nerve on each side above the scarious margins, brown to golden brown, finely cellular-reticulate, carina 3-nerved, green, slightly shorter than to equaling the scarious, obtuse, emarginate apex as a short mucro. Stamens (1-) 2, the anthers 0.2-0.4 mm long, bluntly apiculate; style 3-branched. Achene trigonous, with concave faces, narrowly obovoid, 1.2-1.4 × 0.5-0.8 mm, obtuse to sub-rounded at apex, apiculate, short-acuminate at base with a striate, crystalline basal torus, puncticulate, yellowish to dark brown.

General distribution: Native to the Old World, introduced and now naturalized in the southeastern United States, West Indies, Mexico, Central America, and South America.

Distribution in Puerto Rico: In wet soils bordering rivers and canals, swales, meadows, pastures, agricultural fields, roadside ditches, and waste places. Añasco, Arecibo, Bayamón, Caguas, Carolina, Cataño, Ceiba, Dorado, Gurabo, Humacao, Juncos, Lajas, Loíza, Maunabo, Mayagüez, Naguabo, Río Grande, San Juan, San Lorenzo, Toa Alta, Vega Baja, and Vieques.

Selected specimens examined: PUERTO RICO: Bayamón: Bo. Minillas, along E side of Río Hondo, *Proctor 43558* (US). Caguas: Bo. Bairoa, along Río Bairoa just NE of Highway 30 bridge, *Proctor 46118* (US). Carolina: 65 Inf. Road Río G. de Loíza, *González-Más 1231* (US). Gurabo: At Sub-Station Gurabo, *Woodbury et al. s.n.* (US). Humacao: Mariana, *González-Más 1351* (US). Lajas: Cartagena Lake, *González-Más 949* (US). Mayagüez: Miradero's Road, km 1.15, *González-Más 881* (US). Naguabo: Bo. Río Blanco, *Axelrod 11018* (UPRRP). San Juan: Bo. Hato Rey Norte, along Kennedy Ave. (Highway 2), *Proctor 43034* (US).

23. Cyperus laevigatus L., Mant. Pl. 2: 179. 1771; *Pycreus laevigatus* (L.) Nees, Linnaea 10: 130. 1836; *Juncellus laevigatus* (L.) C. B. Clarke in Hooker f., Fl. Brit. India 6: 596. 1893. Lectotype: South Africa; Cape of Good Hope. *Koenig s.n.* (LINN-70.13), designated by G. C. Tucker & McVaugh in McVaugh (ed.), Fl. Novo-Galiciana 13 : 308. 1993.

Rhizomatous perennial, 3-60 (-70) cm tall; rhizome horizontally creeping, 1-4 mm thick. Culms solitary or clustered along the rhizome at short or sometimes long intervals, obtusely trigonous to subterete, subspongy, coarsely ribbed and channeled, smooth, 0.5-2.7 (-3) mm wide, sheathing bases 1-6 mm wide. Leaves 2-3, basal and lower cauline, reduced to bladeless sheaths or the uppermost with short blades; sheaths reddish brown or dark brown, with cross veinlets, the bladeless ones obliquely truncate at orifice, blade-bearing sheaths with a membranous U-shaped orifice; ligule absent; blades when present subulate, involute or convolute, often canaliculate distally, 1-10 cm × 0.3-1 (-1.6) mm, smooth on margins, midvein indistinct, acuminate or short-acuminate to an often bent callous tip, glaucous-green, smooth, with cross veinlets. Inflorescence a pseudolateral capitate head of 1-22, loosely subdigitate spikelets at the summit of the culm, 4-16 (-22) mm in diam.; involucral bracts (1-) 2 (-3), leaf-like, the lowermost one elongate, erect, appearing as a continuation of the culm, to 7 cm long, the upper ones short, ascending to horizontal or reflexed at maturity; rays not evident; spikelets ovate to oblong-ovate or oblong-lanceolate, 4-11 (-15) × (1.6-) 1.8-2.8 mm, compressed-turgid, subacute at apex, sub-rounded at base, with 10-40 (-56) florets; rachilla broad, appearing scaly on margins from the persistent decurrent bases of the shed scales; scales broadly ovate or subrounded, 1.5-2 × 1.5-2.2 mm, thinly herbaceous, with 3-4 indistinct nerves on each side above the broad scarious margins, whitish or stramineous, distinctly reddish lineolate adaxially, indistinctly so abaxially, carina 3-nerved, light greenish, prolonged as a short mucro at the obtuse to sub-rounded apex, invaginated and 2-keeled abaxially at base. Stamens (2-) 3, the anthers 0.6-1.2 mm long, with a lanceolate-subulate connective bearing crystalline papillae; style 2-branched, reddish lineolate. Achene lenticular, dorsiventrally compressed, with a plane to concave adaxial face and convex abaxial face, oblong-elliptic to ovate-elliptic, 1.1-1.5 × 0.7-1 mm, obtuse at apex, apiculate, short-cuneate at base, estipitate, the surface finely reticulate, glossy, grayish brown or dark brown to blackish.

General distribution: Pantropical; in the New World occurring in the southwestern United States (Texas, Arizona, California, and Nevada), West Indies, Mexico, and South America.

Distribution in Puerto Rico and the Virgin Islands: In coastal areas on wet soils of lake and pond borders, marshes, ditches, and pastures. Aibonito, Coamo, Guánica, Guayama, Guayanilla, Mayagüez, Ponce, Salinas, San Juan, and Santa Isabel; St. Croix, St. Thomas, and Virgin Gorda.

Selected specimens examined: Puerto Rico: Coamo: *Sintenis 2984* (US). Guánica: *Sintenis 3847* (US). Guayama: Pto. Jobos, Rd. 707, *González-Más 703* (US). Guayanilla: *N.L. Britton & Shafer 1792* (US). Ponce: Rd. 2, km 16.6, Las Cucharas, *González-Más 802* (US). Salinas: Aguirre, *N.L. Britton et al. 6031* (US). Santa Isabel: Playita Cortada Sign, Rd. 1, *González-Más 746* (US). St. Croix: Bassin Lagoon, *A.E. Ricksecker 54* (US). St. Thomas: at Bolongo, *Eggers s.n.* (US).

24. Cyperus ligularis L., Syst. Nat. ed. 10, 2: 867. 1759; *Mariscus ligularis* (L.) Urb., Symb. Antill. 2: 165. 1900. Lectotype: West Indies; Jamaica. *Browne s.n.* (LINN-70.37), designated by G. C. Tucker, Syst. Bot. Monogr. 2: 49. 1983.

Mariscus rufus Kunth in Humb., Bonpl., & Kunth, Nov. Gen. Sp. 1 [quarto ed.]: 216. 1816. Type: Mexico; Michoacán. *Humboldt & Bonpland s.n.* (holotype: P-HBK).

Cyperus sintenisii Boeck., Beitr. Cyper. 1: 12. 1888. Type: Puerto Rico, *Sintenis 4952* (holotype: B, destroyed).

Cyperus trigonus Boeck., Beitr. Cyper. 1: 11. 1888. Type: Puerto Rico, *Sintenis s.n.* [collection number not designated in protologue] (holotype: B, destroyed).

Fig. 48. A-D

Rhizomatous perennial, sometimes caespitose, (40-) 50-120 (-190) tall; rhizome short, stout, 1-2 cm thick; roots coarse. Culms solitary or sometimes two together, obtusely trigonous to sub-rounded proximally, often trigonous at apex, light green to glaucous, minutely papillose, 3-6 mm wide, sheathing base of culm stout, 1-3 cm wide. Leaves 5-10, crowded basally, sometimes 1-3 lower cauline; sheaths elongate, closely overlapping at base, conspicuously cross-veined, reddish to purplish brown proximally; ligule absent; blades flattened to subplicate, rarely the margins somewhat inrolled, 30-120 cm × 5-15 mm, conspicuously cross-veined, margins and abaxial midvein harshly antrorsely scabrous, long-

acuminate to triquetrous apex. Inflorescence an open to subcontracted, simple to compound, umbel-like corymb with ascending rays, 5-25 cm diam.; involucral bracts 6-9, leaf-like, ascending, the lowermost ones elongate, to 90 cm long, the uppermost ones short, linear to subulate; primary rays 5-12, unequal, to 20 cm long; secondary rays short, inconspicuous; spikes oblong-cylindrical to subglobose, 5-30 × 8-15 mm, 3-7 congested at ray tips or solitary, the terminal one erect and elongate, the lateral ones (when present) short, divergent, with 15-300 or more densely disposed spikelets; spikelets oblong-elliptic, subcylindrical to subcompressed, 3-8 × 1-2 mm, disarticulating at base, falling entire, with 3-8 florets; rachilla narrowly hyaline-winged; scales ovate, dorsally obtuse to rounded, boat-shaped, 2-3 × 1.5-2 mm, 3- to 5-nerved on each side above the broadly scarious margins, reddish to reddish brown, carina inconspicuous, finely 3-nerved, green, slightly prolonged beyond the acute apex as a short mucro. Stamens 3, the anthers 0.5-1 mm long, apiculate; style 3-branched from just above the base. Achene trigonous with concave faces, obovoid to broadly ellipsoid, slightly curvate on adaxial side, 1.2-1.8 × 0.6-0.8 mm, acute at apex, apiculate, cuneate at base, estipitate, puncticulate, red to reddish brown or blackish at maturity.

General distribution: Southeastern United States (Florida), West Indies, Mexico, Central America, South America, tropical West Africa, Chagos Archipelago (Indian Ocean), Seychelles, and western Pacific islands and atolls.

Distribution in Puerto Rico and the Virgin Islands: Sandy soils of coastal habitats in savannas, marshy or swampy areas, borders of mangrove swamps, margins of ponds and lakes, thickets, scrub forest, beaches, fields, pastures, roadsides, and waste areas. Aguada, Aibonito, Arecibo, Arroyo, Bayamón, Cabo Rojo, Camuy, Carolina, Cataño, Cayey, Cayo Icacos, Cayo Ramos, Ceiba, Coamo, Culebra, Dorado, Fajardo, Guayama, Guayanilla, Humacao, Isabela, Isleta Marina, Loíza, Luquillo, Manatí, Maunabo, Mayagüez, Mona Island, Naguabo, Patillas, Peñuelas, Ponce, Río Grande, Salinas, San Juan, Santa Isabel, Toa Baja, Utuado, Vega Alta, Vega Baja, Vieques, and Yabucoa; St. Croix, St. John, St. Thomas, and Tortola.

Common name: Puerto Rico: *Junco de agua.*

Selected specimens examined: Puerto Rico: Arecibo: *Sargent 682* (US). Bayamón: 2 km W of Bayamón, *McKee 10596* (US). Cabo Rojo: Boqueron, *González-Más 930* (US). Cataño: *Heller & Heller 35* (US). Cayey: Reserva Forestal de Guavate-Carite, *Stimson 1726* (US). Coamo: near hot-spring, *Underwood & Griggs 532* (US). Culebra Island: *N.L. Britton & Wheeler 183* (US). Guayama, *Kuntze 573* (US). Guayanilla: Rd. 336, *González-Más 820* (US). Humacao: Santa Teresa, *Liogier et al. 31335* (US); lecheria, *Goll 24* (US). Mayagüez: *Sintenis 1218* (US). Mona Island: Sardinera, *Britton et al. 1833* (NY). Ponce: Bo. Cañas, along dirt road to Punta Cucharas, *Axelrod & Chávez 7330* (US). San Juan: Martín Peña, *Stevenson 266* (US). Santa Isabel: Rd. 1, km 110.5, *González-Más 753* (US). Vega Baja: Pto. Nuevo, Rd. 686, km 4, *González-Más 1106* (US). Vieques Island: Resolución to Punta Arenas, *Shafer 2900* (US). St. Croix: Salt River, *Ricksecker 107* (US). St. John: Coral Bay Quarter; along dirt road to Bordeaux Mountain, *Acevedo-Rdgz. 5213* (NY, UPRRP, US). St. Thomas: *Pease 22914* (US); Jumbee Gut, *Eggers s.n.* (NA).

25.Cyperus mutisii (Kunth) Andersson, Galapagos Veg . 53. 1854; *Mariscus mutisii* Kunth in Humb., Bonpl., & Kunth, Nov. Gen. Sp. 1 [quarto ed.]: 216, pl. 66. 1816. Type: Colombia; Near Bogotá. *Mutis s.n.* (holotype: P; possible isotype: *Mutis 338*, US!).

Cyperus ochreatus Boeck., Linnaea 36: 386. 1870. Type: Dominican Republic. *Meyerhoff 218* (holotype: B, destroyed).

Cyperus semitribrachiatus Boeck., Linnaea 36: 386. 1870. *Cyperus mutisii* var. *semitribrachiatus* (Böck) Kük. in Engler, Pflanzenr. IV. 20 (Heft 101): 485. 1936. Type: Dominican Republic. *Meyerhoff 217* (holotype: B, destroyed).

Cyperus compresso-triqueter Boeck., Beitr. Cyper. 1: 10. 1888. Type: Puerto Rico, vicinity of Coamo. *Sintenis s.n.* (holotype: B, destroyed; isotype: B).

Cyperus martinicensis Boeck., Beitr. Cyper. 2: 38. 1890. *Cyperus mutisii* var. *martinicensis* (Boeck.) Kük. in Engler, Pflanzenr. IV. 20 (Heft 101): 483. 1936. Type: Martinique. *Duss 417* (holotype: B, destroyed).

Mariscus incompletus sensu Urban, Symb. Antill. 4: 113. 1903, non (Jacquin) Urban, 1900.

Rhizomatous perennial, (20-) 30-120 (-135) cm tall; rhizome short, knotty, thickened, 0.8-15

mm thick. Culms triquetrous, sometimes trigonous proximally, hardened, finely ribbed, smooth or scabridulous on angles distally, (1.4-) 1.8-5 mm wide, sheathing bases 3-10 mm wide. Leaves 2-6, basal and cauline; sheaths elongate, often cross-veined distally, brown, purplish brown proximally; ligule absent; blades linear, plicate, 6-50 (-70) cm × 4-10 (-13) mm, scabridulous adaxially (at least distally), smooth abaxially, antrorsely scabrous on the margins and abaxial midvein, long-acuminate to narrowly plicate apex. Inflorescence a simple, open or contracted, umbel-like corymb with ascending rays, 6-20 (-32) × 5-18 (-22) cm; involucral bracts 5-9, leaf-like, ascending, the lowermost 20-50 cm long; rays 3-7 or absent, 2-26 cm long; spikes, cylindrical, solitary or in digitate clusters of 3-6 ray tips, the lateral ones shorter, 1-6 cm × 5-11 mm, with (-8) 17-140 (-160) densely disposed spikelets which are each subtended by a linear bract at base that is often shorter than the spikelet; spikelets oblong-ellipsoid, 2.5-7 × (0.9-) 1.2-2 mm, slightly compressed to subquadrate, or broadly elliptic in cross section, obtuse at apex, short-cuneate at base, with 1-3 (-5) florets; rachilla broadly hyaline-winged; scales ovate to ovate-elliptic, 2.2-3.4 × 1.5-2.1 mm, thinly herbaceous, coarsely (3-) 4-5 nerved on each side above the scarious margins, light brownish to brown or reddish brown, dark brown lineolate, at least on margins, carina 3-nerved, greenish, equaling or prolonged beyond the obtuse apex as a short mucro. Stamens 3, the anthers 0.5-1 mm long, short or scarcely apiculate; style 3-branched. Achene trigonous, with the adaxial face concave and the abaxial faces plane to slightly concave, adaxially curvate, slightly dorsiventrally compressed, ellipsoid to broadly ellipsoid or oblong-ellipsoid, 1.5-1.8 × 0.7-0.9 mm, obtuse at apex, apiculate, short-cuneate to obtuse at base, short-stipitate, puncticulate, brown to reddish brown.

General distribution: Southern United States (Arizona), West Indies, Mexico, Central America, and South America.

Distribution in Puerto Rico: Grassy slopes, hillsides, and roadbanks. Jayuya, Peñuelas, Ponce, Sabana Grande, Villalba, and Yauco.

Selected specimens examined: PUERTO RICO: Jayuya: Rd. 140 to Doña Juana, km 9, *González-Más 2185* (US). Ponce: On the Adjuntas road 11 mi. from Ponce, *Heller 6358* (US). Yauco: Bo. Sierra Alta, upper slopes and summit area of Pico Rodadero, *Proctor & Rivera 48004* (US).

26. Cyperus nanus Willd., Sp. Pl. 1: 272. 1797. Type: "Habitat in Guinea" (from Martinique fide Vahl, Enum. Pl. 2: 372. 1805) *Isert s.n.* (holotype B-Willd. 1419).

Schoenus capillaris Sw., Prodr. 20. 1788, [non *Cyperus capillaris* Koenig ex Roxb., 1820]; *Mariscus capillaris* (Sw.) Vahl, Enum. Pl. 2: 372; 1805. *Kyllinga capillaris* (Sw.) Griseb., Syst. Veg. Karaiben. 120. 1857; *Cyperus tenuis* var. *capillaris* (Sw.) Kük., Repert. Spec. Nov. Regni Veg. 23: 188. 1926. Type: Hispaniola. *Swartz s.n.* (holotype: S-Sw. R-5607).

Fig. 48. E-H

Slender, caespitose perennial, 2-35 cm tall; rhizome short, knotty; roots filiform. Culm ascending, often arching, trigonous proximally, triquetrous distally, wiry, 0.3-0.4 mm wide, sparsely antrorsely scabrous on angles near apex. Leaves 2-5, basal and lower cauline, the lowermost reduced to bladeless sheaths; sheaths short, uppermost elongating to 3 cm, submembranous, reddish brown to dark brown proximally; ligule absent; blades narrowly linear, folded to V-shaped proximally, subflattened or plicate distally, 1-30 cm × 0.3-1.6 mm, antrorsely scabrous on margins and abaxial midvein, attenuate to triquetrous apex. Inflorescence a single, globose to widely-ellipsoid spike at the summit of the culm, 4-8 × 3-7 mm, with (3-) 5-30 spikelets, rarely with an additional lateral spike; involucral bracts 2-3, leaf-like, reflexed or the lowermost one often ascending at anthesis, 1-8 cm long; spikelets oblong-ovate to oblong-lanceolate, subcompressed, 2-4 × 0.8-1.2 mm, bearing 3-5 florets, the terminal flower staminate or wanting, reflexed at maturity, sometimes the terminal spikelet remaining erect, disarticulating at base, falling entire, the scales spreading with maturing achenes; rachilla narrowly hyaline-winged; scales ovate to broadly ovate-elliptic, 1.2-1.6 × 0.8-1 mm, dorsally acute, coarsely 3- to 4-nerved above the scarious margins, green to light reddish brown, carina 3-nerved, dark green to brown, prolonged beyond the acute to obtuse apex as a short mucro. Stamens 2 or sometimes 1, the anthers oblong-elliptic, 0.3-0.5 mm long, rounded-apiculate; style 3-branched

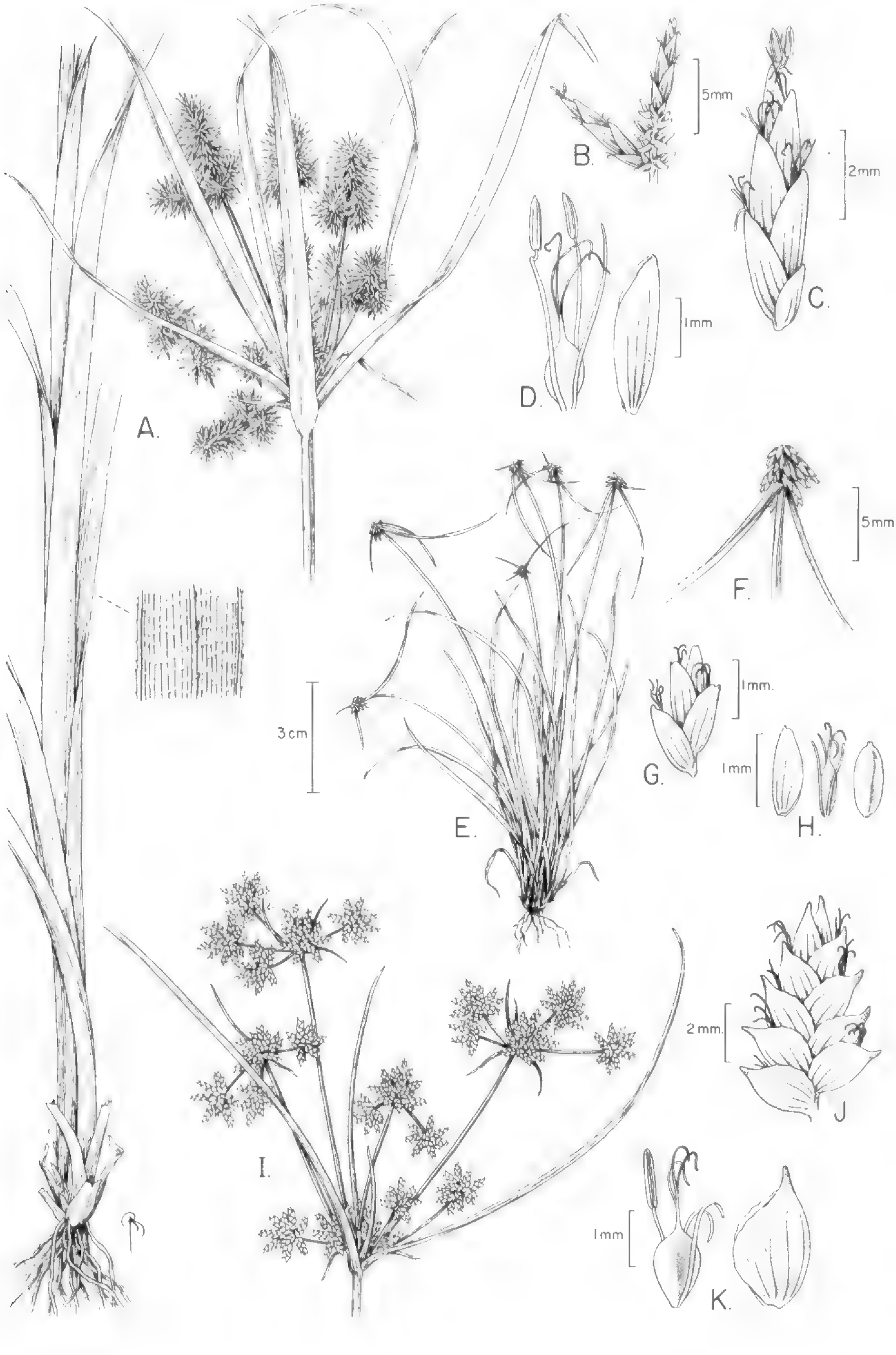


Fig. 48. A-D. *Cyperus ligularis.* **A.** Habit, inflorescence, and detail of abaxial surface of leaf blade. **B.** Portion of inflorescence spike rachis with spikelets. **C.** Spikelet. **D.** Flower and subtending spikelet scale. **E-H.** *Cyperus nanus.* **E.** Habit. **F.** Inflorescence. **G.** Spikelet. **H.** Spikelet scale, flower and achene. **I-K.** *Cyperus elegans.* **I.** Inflorescence. **J.** Spikelet. **K.** Flower and spikelet scale. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

from just above the base. Achene trigonous with plane to slightly concave faces, the adaxial face straight, oblong-ellipsoid, 1-1.2 × 0.5-0.6 mm, obtuse at apex, apiculate, short-cuneate at base, estipitate, puncticulate, light brown to purplish brown at maturity.

General distribution: Throughout the West Indies and Mexico.

Distribution in Puerto Rico and the Virgin Islands: Sandy, shaded, often moist areas on grassy slopes, secondary thickets, hillsides, rocky woods, ridges, scrub thickets, trailsides, and disturbed areas. Cabo Rojo, Mayagüez, Mosquito Island, Palomino Island, and Vieques; Anegada, Big Tobago, Guana Island, St. Croix, St. John, Tortola, Virgin Gorda, and Whistling Key.

Selected specimens examined: PUERTO RICO: Cabo Rojo: Sierra Bermeja, Bo. Llanos Costa, *Proctor & McKenzie 44022* (US). Fajardo: Palominos Island, *Woodbury s.n.* (US). Mayagüez: near San Antonio Hospital, *González-Más 2181* (MAPR, US). ST. JOHN: Cruz Bay, *Raunkiaer s.n.* (US); Along trail to Reef Bay by petrogliph, *Acevedo-Rdgz. et al. 2929* (NY, UPR, UPRRP, US). TORTOLA: Little Camanoe Island, *Proctor 46512* (US).

27. Cyperus ochraceus Vahl, Enum. Pl. 2: 325. 1805. Type: St. Croix; U.S. Virgin Islands. *West 15* (holotype: C-Vahl; photo at US; isotype: C-Schum.).

Cyperus ochraceus var. *excelsior* Kük. in Engler, Pflanzenr. IV. 20 (Heft 101): 182. 1936. Lectotype: Bolivia, Villa Montes, Prov. Tarija, *Pflanz 651* (B), designated by Denton, Contr. Univ. Michigan Herb. 11: 234. 1978.

Cyperus ochraceus var. *minor* Kük. in Engler, Pflanzenr. IV. 20 (Heft 101): 182. 1936. Type: Puerto Rico; near Guánica. *Sintenis 3839* (holotype: B).

Caespitose perennial, (5-) 10-75 (-102) cm tall; rhizome short, horizontal to ascending, 3-10 mm thick. Culms obtusely trigonous or subtriquetrous distally, slender, hardened and stiff, smooth, (1-) 2-4 (-5) mm wide, narrowing subabruptly at apex; sheathing bases 3-12 mm wide. Leaves 3-7, primarily basal, 1-2 lower cauline; sheaths short, thickly herbaceous and stiffened, pale greenish or stramineous, often tinged with brown; ligule absent; blades U- or V-shaped or subfolded proximally, subplicate distally, (5-) 10-50 (-72) cm × (1.5-) 2-8 (-9) mm, substiffened, semi-glossy and finely cellular-reticulate adaxially, finely vined abaxially, smooth or remotely antrorsely scabrous on the margins and abaxial midvein, the apex long-acuminate to triquetrous apex. Inflorescence a simple to compound, open or contracted, umbel-like corymb with ascending rays, (1-) 2-15 × (1.3-) 2.2-16 cm; involucral bracts (4-) 5-8, leaf-like, ascending to horizontal, the lowermost to 30 (-50) cm long; primary rays (3-) 4-13, ascending, elongating up to 12 cm, several short secondary rays often present; spikes glomerulate, spherical to hemispherical, (0.6-) 1-3 cm diam., with (4-) 6-40 (-50) densely disposed, digitately arranged spikelets; spikelets oblong to linear-oblong, (4-) 6-14 × 2-3 mm, compressed, obtuse at apex, broadly obtuse at base, with 10-36 florets; rachilla unwinged; scales broadly ovate, (1.2-) 1.5-2 × 1.2-2 mm, boat-shaped, dorsally 2-keeled proximally, thickly herbaceous, glossy, spongy-thickened proximally, faintly rugulose-reticulate, yellowish brown or stramineous, reddish lineolate adaxially, with 1 indistinct nerve on each side above the scarious margins, carina 3-nerved, the lateral nerves forming two pronounced keels proximally producing a declivity between the two, at the base of which lies the midnerve, all three nerves converging into a single one at the acute apex, there forming a short mucronate-cuspidate, slightly recurved apex, gray-green. Stamen 1, the anther 0.7-1.2 mm long, apiculate; style 3-branched. Achene obtusely trigonous, with slightly convex faces, ellipsoid to broadly ellipsoid, 1-1.5 × 0.4-0.7 mm, short-acuminate at apex, gradually narrowing to a short, subulate beak, acute to subcuneate at base, stipitate, finely cellular- or rugulose-reticulate, reddish brown, maturing dark purplish brown.

General distribution: Southern United States, West Indies, Mexico, Central America, and South America.

Distribution in Puerto Rico and the Virgin Islands: Wet places in swampy or marshy areas, swales, stream or river edges, pond or lake margins, agricultural fields, pastures, roadside ditches, and waste areas. Añasco, Arecibo, Arroyo, Bayamón, Cabo Rojo, Camuy, Carolina, Cataño, Cayey, Coamo, Dorado, Florida, Guánica, Guayama, Guayanilla, Isabela, Ponce,

Quebradillas, Santa Isabel, Toa Alta, Toa Baja, and Vega Baja; St. Croix (type locality).

Selected specimens examined: PUERTO RICO: Arecibo: *Liogier & Martorell 34872* (US). Bayamón: *Heller & Heller 409* (US). Cabo Rojo: Bo. Llanos Costa, Cabo Rojo National Wildlife Refuge, *Proctor & McKenzie 43990* (US). Cataño: Rd. 165, km 5, *González-Más 1151* (US). Coamo: Coamo Springs, *E.G. Britton & Marble 2317* (US). Guánica: Guánica Lake, *Sargent 40* (US). Guayama: Pto. Jobos, Rd. 709, *González-Más 657* (US). Guayanilla: *N.L. Britton 1790* (US). Ponce: Two miles W of Ponce, *Heller 6145* (US). Santa Isabel: Rd. 1, km 110.5, *González-Más 756* (US). Vega Baja: Bo. Cibuco, just SW of Playa Cerro Gordo, *Proctor et al. 45564* (US). ST. CROIX: Orange Grove, *A.E. Ricksecker 308* (US).

28. Cyperus odoratus L., Sp. Pl. 46. 1753; *Torulinium odoratum* (L.) Hooper, Kew Bull. 26: 579. 1972. Lectotype: Jamaica. Sloane, *Voy. Jamaica 1: t. 74, f. 1, 1707*, designated by Dandy in Exell (ed.), Cat. Vasc. Pl. S. Tomé : 360. 1944.

Cyperus ferax Rich., Actes Soc. Hist. Nat. Paris 1: 106. 1792; *Torulinium ferax* (Rich.) Urb., Symb. Antill. 2: 165. 1900. Type: French Guiana; Cayenne. *Leblond s.n.* (holotype: P; isotypes: G, P).

Cyperus michauxianus Schult., Mant. 2: 123. 1824; *Torulinium michauxianum* (Schult.) C. B. Clarke in Urban, Symb. Antill. 2: 56. 1900. Type: United States. "In Carolina", collector unknown. (holotype: probably at M; isotype: possibly at BM).

Cyperus fastuosus Desv. ex Ham., Prodr. Pl. Ind. Occid. 12. 1825. Type: Puerto Rico. Collector unknown (holotype: probably at P-Desv.).

Cyperus poeoides Desv. ex Ham., Prodr. Pl. Ind. Occid. 12. 1825. Type: Puerto Rico. Collector unknown (holotype: probably at P-Desv.).

Torulinium confertum Desv. ex Ham., Prodr. Pl. Ind. Occid. 15. 1825. Type: French Guiana; Cayenne. Collector unknown (holotype: probably at P-Desv.).

Diclidium aciculare Schrad. ex Nees in Martius, Fl. Bras. 2(1): 55. 1842; *Cyperus acicularis* (Schrad. ex Nees) Steud., Syn. Pl. Glumac. 2: 45. 1854, non (Linnaeus) Withering, 1796; *Cyperus ferax* var. *acicularis* (Schrad. ex Nees) Kük. in Engler, Pflanzenr. IV. 20 (Heft 101): 619. 1936. Type: Brazil; Bahia. *Martius s.n.* (holotype: M).

Cyperus cubanus Liebm., Mexic. Halvgr. 34. 1850. Type: Cuba; near Havana. *Liebmann 14355* (holotype: C).

Cyperus sanctae-crucis Liebm., Mexic. Halvgr. 35. 1850. Type: St. Croix, U.S. Virgin Islands. *Oersted 14374* (holotype: C).

Cyperus parvispiculatus Boeck., Beitr. Cyper. 1: 6. 1888. Type: St. Thomas, U.S. Virgin Islands. *Eggers s.n.* (holotype: B, destroyed).

Cyperus flexuosus sensu Grisebach, Fl. Brit. W. I. 566. 1864, pro parte, non Vahl, 1805.

Coarse annual, 25-130 cm tall. Culms solitary or sometimes tufted in reduced forms, trigonous proximally, obtusely triquetrous distally, smooth on angles, 1.8-7 (-8.5) mm wide, sheathing bases stout, 0.5-2.7 cm wide. Leaves 4-9, basal and lower cauline; sheaths loose, the basal ones inflated, obscurely cross-veined, green to purple-tinged or sometimes brown-black proximally, the veins often pale; ligule absent; blades flattish to plicate, up to 1 m long, 5-17 mm wide, antrorsely scabrous on margins and abaxial midvein, acuminate to blunt or rounded tip. Inflorescence a simple or compound umbel-like corymb with ascending rays, 6-32 (-40) cm in diam; involucral bracts 6-15, leaf-like, the lowermost 1-6 dm long; primary rays 5-12, to 22 cm long; secondary rays up to 6 cm long; spikes 1-7 at ray tips, oblong-cylindrical, 2-7 × 1.4-5 cm, with 20-60 spikelets; spikelets linear-lanceolate, subterete, 6-32 × 0.8-1.2 mm, ascending near apex of spike, at right angles to the rachis below, with the internodes of spike rachis between spikelets 1-5 mm wide, the spikelets never radiate, rarely reflexed, with 4-24 florets, disarticulating at the base and at rachilla nodes when mature; rachilla with broad, scarious wings, these becoming thick and corky at maturity, yellowish to brown, enveloping the achene, the rachilla node and floret falling together; scales ovate to elliptic, somewhat dorsally compressed, dorsally rounded or broadly so, 2.2-3.5 (-4) × (1.3-)1.5-2 mm, 1-2 nerved on each side bordering carina above the narrowly scarious margins, light yellowish brown, carina 5- to 7-nerved, green, extending as a short prickly-tipped mucro below the obtuse apex. Stamens 3, the anthers 0.5-0.9 mm long, bluntly apiculate; style 3-branched. Achene trigonous with convex to nearly plane

faces, oblong-obovate to narrowly so, dorsiventrally compressed or only slightly so, (1.6-)1.8-2 × 0.5-0.7 mm, slightly falcate at maturity, acutely narrowed to short beak, cuneate at base, estipitate, minutely puncticulate, light-brown to grayish brown.

General distribution: Cosmopolitan; more common in warmer regions.

Distribution in Puerto Rico and the Virgin Islands: Wet or damp sandy or gravelly soils in marshy and swampy areas, agricultural fields, pastures, roadside ditches, coastal swales; edges of pools and mangrove swamps; pond margins, alluvium along rivers and estuaries, forest trails, and waste areas. Adjuntas, Aguas Buenas, Aibonito, Añasco, Arecibo, Arroyo, Bayamón, Cabo Rojo, Caguas, Camuy, Carolina, Cataño, Cayey, Cayo Ramos, Culebra, Dorado, Fajardo, Florida, Guánica, Guayama, Guayanilla, Humacao, Isabela, Juana Díaz, Juncos, Lajas, Lares, Las Piedras, Loíza, Luquillo, Manatí, Maricao, Maunabo, Mayagüez, Naguabo, Patillas, Peñuelas, Ponce, Río Grande, Río Piedras, Sabana Grande, San Germán, San Juan, San Lorenzo, San Sebastián, Santa Isabel, Toa Baja, Utuado, Vega Alta, Vega Baja, Vieques, Yabucoa, and Yauco; St. Croix, St. John, St. Thomas, Tortola, and Virgin Gorda.

Selected specimens examined: Puerto Rico: Adjuntas: Alto de la Bandera, near Adjuntas, *N.L. Britton & Shafer 2140* (US). Añasco, *Stevens 3214* (NY). Arecibo; Río Abajo State Forest, *Acevedo-Rdgz. 10683* (UPRRP, US). Arroyo: Playa Guilarte, *González-Más 1318* (NY). Bayamón: *Heller & Heller 410* (NY, US). Cabo Rojo: Boqueron, Rd. 4, km 2.5, *González-Más 940* (NY, US). Caguas: Jct. Rts. 52 & 156, *Axelrod et al. 981* (NY). Carolina: Along Rt. 3 at the Río Grande de Loíza, *Taylor & Druitt 8008* (NY). Cataño: Palo Seco, *González-Más 2108* (NY, US). Cayo Ramos: South side, *Liogier et al. 34643* (NY). Culebra, *Britton & Wheeler 58* (NY). Dorado: Rd. 165, km 3.9, *González-Más 250* (NY, US). Fajardo: El Convento, *Liogier 32289* (NY). Guánica: near Ochoa Factory, *González-Más 956* (NY, US). Guayama: Pto. Jobos, Rd. 709, *González-Más 699* (NY, US). Guayanilla: Rd. 336, Bay, *González-Más 811* (NY, US). Humacao: University of Puerto Rico campus, *Acevedo-Rdgz. et al. 5425* (US). Juncos: *Sintenis 2502* (US). Lajas: Laguna Cartagena, *Liogier et al. 30553* (NY). Luquillo: El Verde Field Station, *Taylor 10157* (MO, NY). Mayagüez: *Sintenis 166* (US). Naguabo: Sierra de Luquillo, Caribbean National Forest, *Proctor & Thomas 43205* (US). Patillas: Road 3, km 129.4, *González-Más 1326* (NY). Ponce: Cotto Laurel, Rd. 14, km 122.2, *González-Más 782* (NY, US). Sabana Grande: *Sargent 209* (US). San Germán: *Sargent 93* (US). San Juan: Río Piedras, *Stevenson 51* (US). Santa Isabel: Rd 1, km 110.5, *González-Más 759* (NY). Utuado: Road from Utuado to Lares, *Underwood & Griggs 69* (NY, US). Vega Alta: Rd. 167, km 3, *González-Más 1124* (NY, US). Vega Baja: Bo. Río Nuevo, Rd 686, km 4, *González-Más 1107* (NY, US). Vieques Island: Isabel Segunda to Sierra Encantada, *Shafer 2522* (NY, US). St. Croix: Constitution Hill, *A.E. Ricksecker 164* (US).

29. Cyperus papyrus L., Sp. Pl. 47. 1753. Lectotype: "θ Papyrus 15", Herb. Linn. (UPS), designated by D. A. Simpson in Cafferty & C. E. Jarvis (ed.), Taxon 53: 179. 2004.

Fig. 65. F

Robust perennial, 100-500 cm tall; rhizome short, decumbent, coarse, woody, 1-3 cm thick. Culms loosely tufted along rhizome, erect, firm, obtusely triquetrous, smooth, 5-16 mm wide midculm, to 20 mm wide at base. Leaves reduced to bladeless sheaths or sheaths of sterile shoots sometimes bearing short blades; proximal sheaths coriaceous, distal ones herbaceous distally, finely and closely veined, scabridulous to smooth on veins abaxially, obliquely truncate at orifice, brown; ligule absent. Inflorescence an umbelliform, compound corymb with numerous, ascending to spreading rays, 15-50 × 10-40 cm; involucral bracts short, 7-14, like the sheaths, horizontally spreading, much shorter than corymb rays, 2-15 cm long; rays numerous, subequal in length, 8-50 cm long; secondary rays bearing spikes 3-5, to 8 cm long; spikes cylindrical, 10-35 × 7-18 cm, subloosely to subdensely bearing 5-40 spicately arranged spikelets; spikelets linear, subcompressed, wavy-margined, 4-10 (-12) × 0.7-1 mm, acuminate, cuneate at base, with 5-20 florets; rachilla hyaline-winged; scales elliptic to ovate-elliptic, boat-shaped, dorsally obtuse, 1.7-2.3 × 0.7-1.4 mm, submembranous, brownish and closely 2- to 3-nerved, often obscurely so along either side of carina, stramineous to golden brown on sides with scarious margins, carina 3-nerved,

green or light brownish, shortly prolonged beyond the obtuse apex as a mucro. Stamens 3, the anthers 0.7-1.7 mm long, with a rounded or linear, papillate apiculum; style 3-branched. Achene trigonous, plane on abaxial faces, concave and slightly curvate on adaxial face, oblong or subobovoid-oblong, 0.8-1 × 0.4-0.5 mm, obtuse at apex, not apiculate, obtuse at base, estipitate, shiny, smooth, greenish, maturing grayish brown.

General distribution: Native to eastern tropical Africa and Madagascar. Widely cultivated and planted as an ornamental elsewhere. Introduced and naturalized or escaped from cultivation in the New World, occurring in the United States (Florida, Louisiana, and California) and the West Indies.

Distribution in Puerto Rico: Naturalized in wet areas of standing water along river banks, creeks, swales, and roadside ditches; Ciales, Lares, and Río Grande.

Selected specimens examined: PUERTO RICO: Ciales: Bo. Cordillera, finca of José Colón, ca. 0.6 km N of Rd. 146 at km 21.6., *Proctor & Quevedo 48890* (US). Lares: Bo. Callejones, Rt. 453, just before Rt. 454, *Axelrod 12640* (UPRRP).

30. Cyperus planifolius Rich., Actes Soc. Hist. Nat. Paris 1: 106. 1792; *Mariscus planifolius* (Rich.) Urb., Symb. Antill. 2: 165. 1900. Type: St. Croix, U.S. Virgin Islands. *Richard s.n.* (holotype: P).

Cyperus purpurascens Vahl, Enum. Pl. 2: 359. 1805; *Mariscus purpurascens* (Vahl) C. B. Clarke, Bull. Misc. Inform. Kew 1893: 283. 1893. Type: St. Croix; U.S. Virgin Islands. *West s.n.* (holotype: C-Vahl).

Cyperus brunneus sensu Grisebach, Fl. Brit. W. I. 565. 1864, in part, non Swartz, 1797.

Robust, rhizomatous perennial, (20-) 40-100 cm tall; rhizome short and thick. Culms solitary, 3-angled, (1.5-) 2-4 (-5) mm wide at base, smooth, the sheathing bases 1-2.5 cm wide. Leaves 8-20, primarily basal, crowded with short nodes, subdistichous; sheaths short, distinctly fine-veined, reddish to purple-brown, the inner band finely veined; ligule absent; blades stiff, flattish, 50-90 cm × (4-) 6-12 (-15) mm, glaucous, antrorsely scabrous on margins and midvein beneath, cross-veined, sometimes obscurely so, frequently pale beneath, the surface reddish brown lineolate, long-acuminate to triquetrous apex. Inflorescence an open, compound umbel-like corymb or rarely congested in 1 or 2 head-like clusters, (4-) 8-14 (-20) cm diam.; involucral bracts 6-9, leaf-like, the lowest 18-50 cm × 4-10 mm, the upper linear, subulate; rays (6-) 8-9 (-12), unequal, obscurely 3-angled to slightly compressed, to 13 cm long, 0.6-1.2 mm wide, bearing clusters of spikes at apex; spikes broadly ovate to broadly oblong-ovate, 1.3-2.5 × 1.5-2.8 cm, with 6-30 spikelets; spikelets narrowly linear, 6-15 (-20) × 1.4-1.8 (-2) mm, spreading, falling entire, the lower ones divergent to reflexed at maturity, with 7-29 florets; rachilla broadly hyaline-winged; scales ovate-lanceolate, acutely keeled, 2.4-3.2 (-3.5) × 1.4-2.0 mm, closely 4- to 5-nerved on each side along carina, membranous, pale brown to reddish or reddish brown, with scarious margins, the narrow, 3-nerved carina ending in a short mucro below the acute apex. Stamens 3, the anthers 1-1.2 mm long, with a minute, triangular, black appendage at apex; styles 3-branched to below the middle. Achene trigonous with plane to slightly convex sides, curvate on adaxial side facing rachilla, ellipsoid-obovoid to oblong-obovoid, 1.3-1.7 × 0.6-0.9 mm, distinctly subulate-apiculate at obtuse apex, cuneate at base, minutely puncticulate, blackish at maturity.

General distribution: Southeastern United States (Florida, Georgia, and Alabama), West Indies, eastern coastal Mexico and Central America, and northeastern Brazil.

Distribution in Puerto Rico and the Virgin Islands: Coastal habitats, in sand or sandy soil of beaches, dry scrub forest, rocky thickets, coastal rocks, sea-cliffs, edge of mangrove swamps, and coastal swales. Aguadilla, Cabo Rojo, Cayo Icacos, Culebra, Desecheo, Fajardo, Maunabo, Mona Island, Monito, Río Grande, San Juan, Vieques, and Yabucoa; Anegada, Buck Island, Capella Island, Curt Cay, Deadchest Island, French Cap Island, Flannigan Island, George Dog Island, Great Camonoe Island, Hilo Island, Leduck Island, Little Hans Lollick, Louange Cay, Norman Island, St. Croix, St. James, St. John, St. Thomas, Salt Island, Tortola, Virgin Gorda, Water Island, Watson Rock, and West Dog Island.

Common names: Puerto Rico: *Cortadora, Cortadera, Lambedora.*

Note: This species is rare on the mainland of Puerto Rico and is often confused with *Cyperus*

brunneus with which it is closely related. The inflorescence of *C. planifolius* is much broader and often more open [(4-) 8-14 (-20) cm diam.] than the often congested, head-like inflorescence of *C. brunneus* which is 2-8 (-13) cm in diam. The nerves on each side of the reddish scales of *C. planifolius* are crowded towards the dorsal carina and often less distinct than the brownish ones of *C. brunneus* which are more widely spaced and extend down to the scarious-margined edges of the scale. The achene of *C. planifolius* is slightly curvate on the adaxial side and is ellipsoid-obovoid to oblong-obovoid, 0.6-0.9 mm wide, while that of *C. brunneus* is plane and obovoid to ellipsoid-obovoid, 0.8-1.1 mm wide.

Selected specimens examined: PUERTO RICO: Culebra Island: *N.L. Britton & Wheeler 51* (US). Mayagüez: Monito Island Natural Reserve, *Breckon et al. 5161* (US). Ponce: Bo. Cañas, Punta Cuchara-Laguna de las Salinas region, E side of El Tuque Recreation Area, *Breckon & Lewis 4065* (US). Vieques Island: Cerro Ventana, *Shafer 2879* (US). Yauco: Tamarindo Beach to Jacinto Point, along shoreline below Guánica State Forest, *Strong et al. 441* (US). ST. JOHN: East End Quarter, east of Southside Pond, *Acevedo-Rdgz. et al. 1831* (NY, US, VINPS). ST. THOMAS: Water Island, *N.L. Britton et al. 134* (US); *Eggers 224* (NA). VIRGIN GORDA: Near Valley, *Britton & Fishlock 1089* (US).

31. Cyperus polystachyos Rottb., Descr. Pl. Rar. 21. 1772; *Pycreus polystachyos* (Rottb.) P. Beauv., Fl. Oware 2: 48. 1807. Type: India. *Koenig s.n.* (holotype: C-Rottb.; isotype: C-Vahl)*.

Cyperus hahnianus Boeck., Flora 61: 138. 1878; *Pycreus polystachyos* var. *hahnianus* (Boeck.) C. B. Clarke in Urban, Symb. Antill. 2: 18. 1900. Type: Martinique. *Hahn s.n.* (holotype B, destroyed).

Pycreus odoratus sensu Urban, Symb. Antill. 4: 110. 1903, non (Linnaeus) Urban, 1900.

Cyperus odoratus sensu Britton & P. Wilson, Bot. Porto Rico 5: 81. 1923, non Linnaeus, 1753.

Caespitose perennial or annual, (7-) 18-77 (-115) cm tall; rhizome (when present) short, thickened; roots aromatic. Culms erect, triquetrous, often obtusely so, subtrigonous proximally, firm to subhardened, finely ribbed, smooth, (0.8-) 1.2-2.3 (-2.8) mm wide, sheathing bases 2-7 mm wide. Leaves 5-16, basal and lower cauline; sheaths short proximally, reddish brown proximally, pale brown to greenish distally; ligule absent; blades V-shaped proximally, flattened-plicate distally, (3-) 9-45 (-67) cm × 1.2-4 mm, smooth, semi-glossy and finely cellular-reticulate adaxially, with remote, antrorse, swollen-based, whitish or crystalline prickles on the margins and abaxial midvein, long-acuminate to triquetrous apex. Inflorescence a simple to compound, umbel-like corymb with ascending rays, or contracted into a single, head-like, lobed cluster, 1-6 × 1.4-11 cm; involucral bracts (3-) 4-7, leaf-like, ascending to horizontal, the lowermost one 3-23 (-30) cm long; primary rays 3-8, elongating up to 6 cm or essentially absent, secondary rays absent; spikes small, ovoid to turbinate, 9-16 × 4-8 mm, fasciculately or spicately disposed at ray tips, with 2-6 somewhat loosely disposed spikelets; spikelets linear-lanceolate to linear, 6-13 × 1-1.6 mm, the scales spreading to 2 mm wide, compressed, short-acuminate at apex, short-cuneate at base, with 6-28 florets; rachilla hyaline-winged; scales ovate-elliptic to oblong-elliptic, dorsally acute or subacute, (1.2-) 1.4-1.8 (-2) × 0.8-1.5 mm, thinly chartaceous, 1- to 2-nerved along carina above the broadly scarious margins, stramineous to yellowish brown or reddish brown, carina 3-nerved, green, prolonged beyond the acute to obtuse apex as a short mucro. Stamens (1-) 2, the anthers 0.4-0.6 mm long, rounded-apiculate; style 2-branched. Achene biconvex to broadly so with convex faces, oblong, 0.8-1 (-1.2) × 0.4-0.6 mm, truncate at apex, short-apiculate, asymetrically cuneate at base, substipitate, puncticulate to essentially smooth and glossy with an underlying reticulation, light brown to brown or grayish brown at maturity.

General distribution: Cosmopolitan; more common in warmer regions.

Distribution in Puerto Rico and the Virgin Islands: Wet sandy or gravelly soils along riverbanks, borders of lagoons, pond margins, marshy areas, pastures, coastal thickets, sand bars, sandy barrens, roadside ditches, and disturbed areas. Arecibo, Bayamón, Cabo Rojo, Camuy, Carolina, Cataño, Ceiba, Ciales, Cidra, Coamo, Dorado, Fajardo, Guayama, Humacao, Isabela, Lajas, Loíza, Manatí, Mayagüez, Naguabo, Patillas, Río Grande, San Juan, San Lorenzo,

Utuado, Vega Alta, Vega Baja, and Yabucoa, St. Thomas and Tortola.

Notes: Plants in the flora area are referable to *C. polystachyos* var. *polystachyos*, with a more contracted inflorescence. *An illustration (Plukenet, *Phytographia, Amaltheum botanicum, t. 416, f. 6. 1705*) was designated as lectotype of *Cyperus polystachyos* by Corcoran, Catholic Univ. Amer., Biol. Ser. 37: 26. 1941. However, Tucker (1994) cites a Koenig collection at C as the holotype. Although we have not seen the material at C, the Rottbøll herbarium is there and he was director of the Copenhagen Botanical Garden from 1770-1797. If what appears to be original material has in fact been rediscovered, then it supersedes Corcorans' lectotypification (I.C.B.N. Art. 9.17).

Selected specimens examined: Puerto Rico: Arecibo: *González-Más 1828* (US). Bayamón: Finca Santa Ana, *Hioram 347* (US). Cataño: Rd. 165, km 5, *González-Más 1150* (US). Dorado: Cerro Gordo Beach, *Liogier 10240* (US); San Antonio, *González-Más 349* (US). Fajardo: *Sintenis 1314* (US). Isabela: Bo. Coto, W bank, estuary of Río Guajataca near its mouth, *Proctor et al. 42357* (US). Lajas: Laguna Cartagena, *González-Más 945* (US). Manatí: *Sintenis 6789* (US). Mayagüez: Guanajibo, Rd. 102, km 5.3, *González-Más 826* (US). Naguabo: Daguao River, Rd. 3, *González-Más 233* (US). Río Grande: El Verde Forest entrance, *González-Más 137* (US). San Juan: Stone Quarry, 2 mi. E of Santurce, *Heller & Heller 1308* (US). Vega Baja: Bo. Cibuco, just SW of Playa Cerro Gordo, *Proctor et al. 45587* (US).

32. Cyperus pulguerensis M.T. Strong **sp. nov.** Type: Puerto Rico. Manatí: Bo. Tierras Nuevas Saliente, Road 686, ca. 100 m E of intersection at El Pulguero, 24 Jun 1987, *Proctor & Thomas 43804* (holotype: US; isotype: SJ).

Fig. 49. A-K

A Cyperus confertus Sw. spiculis squamis mucronatis rectis differt.

Caespitose perennial, 30-50 cm tall; rhizome knotty, bases cormose. Culm erect, triquetrous, ribbed and channeled, 1.3-3 mm wide, smooth. Leaves 4-7, primarily basal and lower cauline, spreading; ligule absent; sheaths short, the inner band membranous, minutely red-dotted, concave at orifice; blades linear, 6-30 cm × 2-3 mm, folded proximately, subflattened distally, finely veined and dull adaxially, finely cellular-reticulate and subglossy adaxially, attenuate to triquetrous tip. Inflorescence a simple umbel-like corymb with 5-6 ascending rays; involucral bracts 5-7, the lowermost elongate, leaf-like; rays 2-8 cm long; spikes broadly subglobose-oblong, dense, with 15-40 spikelets; spikelets spreading-divaricate or the lowermost reflexed, slender, 6-14 × 1.5-1.8 mm, 5- to 14-flowered; rachilla hyaline winged; scales loosely imbricate, ovate-elliptic, 2.5-3 × 1.7-2 mm, uniformly light brown or light yellowish brown, carina light green, 3-nerved, prolonged beyond the obtuse apex as a thickened, elongate, straight, minutely prickle-tipped mucro, the sides coarsely 3- to 4-nerved. Stamens 3, the anthers 0.4-0.6 mm long; style 3-branched. Achene narrowly ellipsoid, triquetrous, 1.3-1.6 × 0.6-0.7 mm, short-cuneate at base, acute to an apiculate apex, puncticulate, dark reddish at maturity.

General distribution: Endemic to Puerto Rico.

Distribution in Puerto Rico: On white sand at the western end of Laguna Tortuguero. Only known from the type collection.

Note: Cyperus pulguerensis is similar in habit to *C. confertus* but differs in the spikelet scales which have the carina prolonged at apex as a straight thickened murcro vs. a distinctly to slightly excurved cusp in *C. confertus*.

33. Cyperus rotundus L., Sp. Pl. 45. 1753. Lectotype: India. *Herb. Hermann* 1: 3, No. 36 (BM-2), designated by G. C. Tucker, Syst. Bot. Monogr. 43: 100. 1994.

Cyperus pseudo-variegatus Boeck., Beitr. Cyper. 2: 37. 1880. Type: Martinique. *Duss 449* (holotype: B, destroyed).

Stoloniferous perennial, (6-) 10-80 cm tall; stolons elongate, often bearing tubers. Culms solitary, tuberous at base, triquetrous, subcompressed, 0.7-3 mm wide, finely ribbed, smooth, sheathing base of culm 3-10 mm wide. Leaves 7-17 (-24), clustered at lower cauline and base; sheaths short, cross-veined, sometimes indistinctly so, pale brown; ligule present on lower sheaths, short and often faint, absent on upper sheaths; blades shorter than the culms, folded or V-shaped proximally, flattish or subplicate distally,

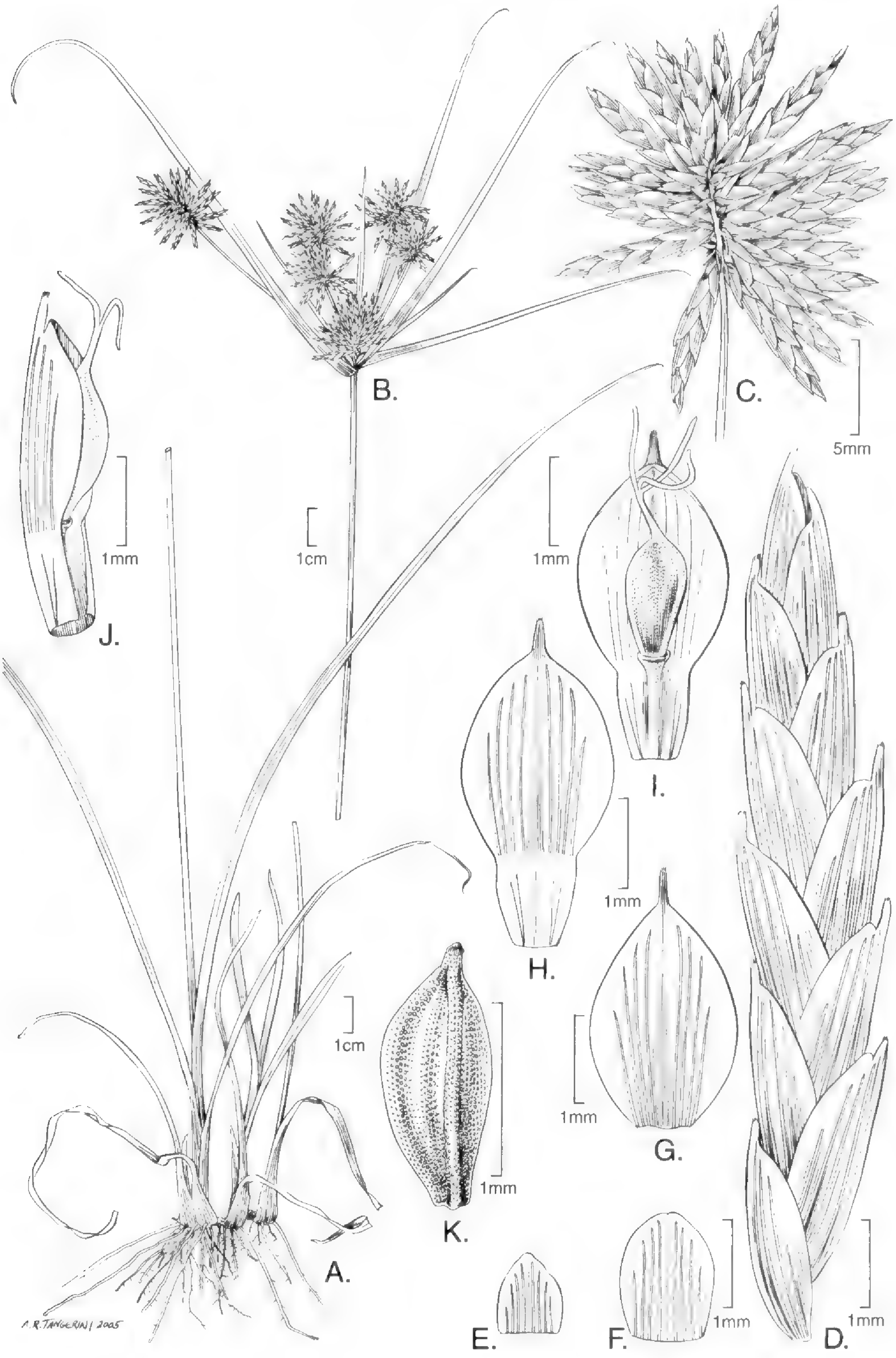


Fig. 49. A-K. *Cyperus pulguerensis*. **A.** Habit. B. Inflorescence. C. Inflorescence spike. D. Spikelet. E-F. Sterile bracts subtending base of spikelet. G. Lowermost spikelet scale (spread open). H. Upper spikelet scale (spread open, dorsal view). I. Upper spikelet scale (spread open, ventral view, showing winged rachilla and developing achene). J. Spikelet scale (side view) clasping developing achene. K. Achene. (A-K, from the type, *Proctor & Thomas 43804*).

5-42 cm × 2-7 (-9.5) mm, antrorsely scabrous along margins and midvein beneath distally, acuminate to triquetrous apex. Inflorescence a simple to compound, narrowly hemispherical, umbel-like corymb, (2-) 3-14 (-17) × (1.5-) 2.5-10 (-21) cm; involucral bracts 2-5, leaf-like, the lowest 1-9 (-14) cm long; rays (1-) 2-7 or absent, unequal, 4-10 cm long; spikes 1 (-3) at ray tips, broadly ovoid, 1.5-4 × 1.5-7 cm, with 2-12 spikelets; spikelets linear-lanceolate, subcompressed, 10-45 × 1.5-2 mm, acute at apex, cuneate at base, with 9-51 florets; rachilla flexuous, hyaline-winged; scales deciduous, ovate to broadly ovate or ovate-elliptic, 2.8-3.5 × 2-2.4 mm, subacutely to obtusely keeled, 2- to 3-nerved on each side above the scarious margins, submembranous, dark reddish brown to purplish brown or blackish, with 1-2 indistinct lateral nerves evident only at proximal base of scale, the sides smooth for the most part, carina 3- or 5-nerved, greenish, ending in a short, slightly excurved mucro at the cleft of the obtuse emarginate apex. Stamens 3, the anthers 1.5-2.2 mm long, apiculate; styles elongate, 3-branched to below the middle, the unbranched portion subflattened. Achene trigonous with the adaxial face concave and the abaxial faces plane to slightly convex, ellipsoid to oblong-ellipsoid, 1.4-1.8 × 0.7-0.9 mm, obtuse to sub-rounded at apex, short-apiculate, short-cuneate at base, estipitate, minutely puncticulate, brown to blackish.

General distribution: Cosmopolitan; more common in warmer regions.

Distribution in Puerto Rico and the Virgin Islands: Sandy soils of coastal areas and cultivated grounds, in riverbanks, roadside ditches, sugar cane fields, pastures, lawns, disturbed areas, and waste places. Añasco, Bayamón, Cabo Rojo, Camuy, Carolina, Cataño, Ceiba, Coamo, Culebra, Desecheo, Dorado, Fajardo, Guánica, Guayama, Guayanilla, Humacao, Las Piedras, Loíza, Mayagüez, Mona Island, Naguabo, Peñuelas, Ponce, Salinas, San Germán, San Juan, Santa Isabel, Vieques, Yabucoa, and Yauco; St. Croix, St. John, St. Thomas, Tortola, and Virgin Gorda.

Common names: Puerto Rico: *Coquí, Coquillo, Yerba Coqui.*

Note: See discussion under *C. esculentus* for differences between it and *C. rotundus*.

Selected specimens examined: Puerto Rico: Bayamón: Rd. 2, km 14.6, *González-Más 1131* (US). Cabo Rojo: Boqueron, Rd. 4, km 2.4, *González-Más 937* (US). Camuy: *Underwood & Griggs 208* (US). Desecheo Island, south-facing slope just N of Puerto de los Botes, *Breckon 4947* (US). Dorado: Rd. 165, km 3.9, to Toa Baja, *González-Más 258* (US). Guánica: *Sargent 42* (US). Guayama: Pto. Jobos, Rd. 707, *González-Más 689* (US). Mayagüez: *Sintenis 12* (US). Mona Island: Sardinera, *Otero & Chardón 837* (US). Naguabo: Daguao River, Rd. 3, *González-Más 211* (US). Ponce: Rd. 14, banks of Inabón River, *González-Más* 776 (US). San Juan: Río Piedras, *Stevenson 46* (US). Santa Isabel: Rd. 1, km 110.5, *González-Más 758* (US). Vieques Island: Mosquito to Playa Grande, *Shafer 2856* (US). Yabucoa: *Sintenis 5089* (US). Yauco: Rd. 2, near Río Loco, *González-Más 853* (US). St. Croix: Bassin Yard, *A.E. Ricksecker 159* (US). St. John: Coral Bay, *Raunkiaer s.n.* (US). St. Thomas: *Eggers s.n.* (NA, US). Tortola: *Fishlock 134* (US).

34. Cyperus sphacelatus Rottb., Descr. Pl. Rar. 21. 1772 . Lectotype: Surinam. *Rolander 32* (C-Rottb., photo at F, US, IDC microfiche: type herbarium nr. 67 II, 4-5), designated by McLaughlin, Catholic Univ. Amer. Sci. Stud. 5: 71. 1944.

Cyperus balbisii Kunth, Enum. Pl. 2: 63. 1837. Type: Dominican Republic. *Bertero s.n.* (holotype: probably at TO).

Caespitose annual, (10-) 13-67 (-90) cm tall. Culms slender, triquetrous, sometimes trigonous proximally, finely ribbed, smooth, 0.6-2.4 mm wide, sheathing bases (1.5-) 2-6 mm wide. Leaves 2-6, basal and lower cauline; sheaths elongate, subloose, yellow-green or brownish; ligule absent; blades plicate, 3-42 cm × (1.3-) 1.5-4 (-5) mm, smooth, antrorsely scabrous on the margins and abaxial midvein, at least distally, narrowly acuminate to triquetrous apex. Inflorescence a simple or compound, open to contracted, umbel-like corymb with ascending rays, (2-) 3-13 (-15) × (2-) 3-17 (-26) cm; involucral bracts (4-) 5-7, ascending to patent, leaf-like, the lowermost one to 30 cm long; primary rays (2-) 3-7 or essentially absent, unequal, elongating to 15 cm, the secondary lateral rays short or wanting; spikes solitary or 2-3 at ray tips (lateral spikes smaller than central one), broadly ovoid, 1-3.5 (-4.5) × 1-

5 (-6.5) cm, with 4-16 somewhat loosely disposed, spicately arranged spikelets; spikelets linear-lanceolate, (5-) 6-23 (excluding denuded rachilla) × 1.2-1.8 (-2) mm, subflattened, acute to acuminate at apex, cuneate at base, with 6-22 (-28) florets, the scales spreading with developing achenes; rachilla unwinged; scales ovate-elliptic, dorsally acute to obtuse, 2.2-3 × 1.6-2.2 mm, thinly herbaceous, 2-3 nerved on each side above the broadly scarious margins, stramineous to light brown or yellowish brown, often reddish or brown lineolate, usually with a brown-black or purple-black stain on the scarious margins, carina broad, finely 5- to 7-nerved, greenish, prolonged at the subobtuse to subacute emarginate apex as a short mucro. Stamens 3, the anthers 0.4-0.6 mm long, bluntly apiculate; style 3-branched. Achene trigonous with adaxial face concave and abaxial faces plane to slightly concave, narrowly ellipsoid or ellipsoid-obovoid, 1.2-1.5 × 0.6-0.9 mm, obtuse at apex, short-cuneate at base, short-stipitate with a small basal torus, obscurely puncticulate to essentially smooth, reddish brown to dark brown.

General distribution: Pantropical.

Distribution in Puerto Rico and the Virgin Islands: In open, often wet areas on sandy and gravelly soils of washes along rivers and streams, swales, grassy slopes and hillsides, rocky ridges, marshy areas, clearings, pastures, ditches, roadsides, lawns, and waste areas. Adjuntas, Aguas Buenas, Aibonito, Añasco, Arecibo, Bayamón, Cabo Rojo, Caguas, Carolina, Cataño, Cayey, Cayo Ramos, Ceiba, Ciales, Corozal, Dorado, Fajardo, Guaynabo, Gurabo, Humacao, Isabela, Las Piedras, Loíza, Luquillo, Manatí, Maunabo, Maricao, Mayagüez, Naguabo, Orocovis, Patillas, Peñuelas, Ponce, Río Grande, Salinas, San Juan, San Lorenzo, San Sebastián, Trujillo Alto, Utuado, Vega Alta, Vega Baja, Vieques, and Yabucoa; St. Croix, St. Thomas, and Tortola.

Selected specimens examined: Puerto Rico: Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10639* (UPRRP, US). Bayamón: *Underwood & Griggs 876* (US). Caguas: Bo. Cañabón, along W side of Río Cagüitas, just S of Rd. 156, *Proctor 46149* (US). Carolina: Boca de Cangrejos, *González-Más 1026* (US). Corozal: At Sub-Station Corozal, *Woodbury et al. s.n.* (US). Dorado: to Cerro Gordo, Rd. 693, km 11.3, *González-Más 284* (US). Humacao: Mariana, *González-Más 1349* (US). Loíza: Bo. Medianía Alta, Miñi Miñi, *Proctor & Colón 49565* (US). Manatí: Laguna Tortuguero, *Acevedo-Rdgz. & Cedeño 9466* (FTG, NY, UPR, UPRRP). Maunabo: La Pica, Rd. 3, km 105, *González-Más 1338* (US). Maricao: Rd. 120, *González-Más 416* (US). Mayagüez, *Sintenis 90* (US). Naguabo: Rd. 191, km 21.1, towards Sierra de Luquillo, *González-Más 1399* (US). Patillas: Rd. 2, km 129.4, *González-Más 1329* (US). Ponce: On the Adjuntas road 10 mi. from Ponce, *Heller 6239* (US). San Juan: Río Piedras, Sabana Llana, Highland Park, *González-Más 1216* (US). Vega Baja: Tortuguero, Rd. 681, km 1, *González-Más 1049* (US). Vega Alta: Bo. Sabana, silica-sand area NE of Regadera, *Proctor & Concepción 41847* (US). Vieques Island: 1 km N of Laguna Playa, *Fosberg 57571* (US). St. Thomas: Crown, *E.G. Britton & Marble 1344* (US). Tortola: Road Town to High Bush, *N.L. Britton & Shafer 758* (US).

35. Cyperus squarrosus L., Cent. Pl. 2: 6. 1756; *Mariscus squarrosus* (L.) C. B. Clarke in Hooker f., Fl. Brit. India 6: 623. 1893. Lectotype: India. *Koenig s.n.* (LINN-70.8 B right hand specimen; isolectotype: S-LINN G-6816), designated by J. Kern, Blumea 10: 642. 1960.

Scirpus intricatus L., Mant. Pl. 182. 1771; *Cyperus aristatus* Rottb., Descr. Pl. Icon. Rar. 22. 1772, *nom. illeg.* Lectotype: South Africa. (LINN-71.50), designated by C. B. Clarke, J. Linn. Soc., Bot. 30: 313. 1894.

Cyperus inflexus Muhl., Descr. Gram. 16. 1817. Type: United States; Pennsylvania. *Muehlenberg Herb. no. 27* (holotype: PH; isotype: B-Willd. 1402).

Cyperus cuspidatus sensu Britton & P. Wilson, 1923, non Kunth, 1816.

Caespitose annual, 1-17 (-20) cm tall; roots fine. Culms tufted, triquetrous, wing-angled, soft, finely ribbed, smooth, 0.4-1.3 (1.6) mm wide. Leaves 1-3, basal; sheaths short, loose and inflated, thin, pale green, light brown, or purple-black, reddish to brownish lineolate, semi-glossy, subcellular-translucent; ligule absent; blades linear, folded proximally, subplicate distally, (1-) 2-10 (-15) cm × 0.8-2.7 (-3) mm (unfolded), adaxial surface distinctly cellular-reticulate, smooth on margins and abaxial midvein, long-acuminate to triquetrous apex. Inflorescence a simple umbel-like corymb with few ascending

rays, 0.5-4 (-6) × 0.5-3 (-4.5) mm; involucral bracts (1-) 2-4, leaf-like, the lowest one strongly ascending, to 11 cm long, the others divergent; rays 1-3 (-6) or absent, unequal, 4-40 mm long; spikes 1 (-2) at ray tips, ovoid or oblong, 5-20 mm in diam., with (2-) 6-30 (-40) densely to subloosely disposed spikelets; spikelets ovate-lanceolate to oblong-lanceolate, subcompressed, (2.5-) 3-11 × 0.8-2 (-2.2) mm (excluding awns), obtuse at apex, short-cuneate at base, with (6-) 8-26 (-34) florets; rachilla indistinctly winged; scales oblong-lanceolate, 1.3-1.8 × 0.6-1 (-1.2) mm (excluding awn), dorsally acute, coarsely 4-5 nerved on each side above the entire margins, membranous, subtranslucent, reddish to blackish lineolate, stramineous, yellow brown, or brownish red, lustrous, carina 1-nerved, greenish, the subtending lateral nerves converging at the obtuse apex forming a 0.5-1.3 mm long excurved awn. Stamen 1, the anthers 0.2-0.4 mm long, bluntly apiculate; styles 3-branched. Achene trigonous with slightly convex to flat faces, lanceoloid-obovoid or obovoid, 0.6-0.9 (-1.1) × (0.2-) 0.3-0.4 (-0.5) mm, broadly rounded to truncate or 3-lobed at apex, apiculate, cuneate at base with a small torus, lustrous-papillose, light brown to blackish.

General distribution: Cosmopolitan.

Distribution in the Virgin Islands: Often in sandy, open habitats. Anegada and St. Thomas. To be expected in Puerto Rico.

Selected specimens examined: ANEGADA: Near The Settlement, *N.L. Britton & Fishlock 1006* (US); Along track ca. 1.5 km N of The Settlement, *Proctor & Haneke 45971* (US); Just inland from Loblolly Point, *Proctor & Haneke 45968* (US). ST. THOMAS: *Eggers s.n.* (US).

36. Cyperus subtenuis (Kük.) M.T. Strong, comb. & stat. nov.; *Cyperus nanus* var. *subtenuis* Kük. in Engler, Pflanzenr. IV. 20 (Heft 101): 536. 1936. Type: Navassa Island. *Ekman 10806* (lectotype: US!; isolectotype: NY), here designated.

Cyperus tenuis sensu Grisebach, Fl. Brit. West Indies Is. 563. 1864, non Swartz, 1788.

Caespitose perennial, 4-40 cm tall; rhizome short. Culms erect to ascending, slender, triquetrous, flattened-trigonous distally, firm, smooth to antrorsely scabrous on margins (at least distally), glabrous. Leaves 3-5 per culm, basal and lower cauline, ascending; sheaths short, herbaceous, distinctly veined, smooth to remotely scabrous, light brown to reddish brown proximally, glabrous, the inner band concave to truncate at orifice; ligule absent; blades linear, subflattened to folded, 4-25 cm × 0.7-2 (-2.5) mm, soft, herbaceous, green, abaxially distinctly veined and often scabrous, adaxially smooth, glabrous, finely cellular-reticulate, margins and abaxial midvein finely mixed antrorsely-retrorsely scabrous, attenuate to triquetrous tip. Inflorescence a single small spike at the summit of the culm; involucral bracts 2-4, divergent to reflexed, exceeding length of inflorescence; spikes obovoid to oblong-obovoid, 5-13 mm diam., the spikelets reflexed except for the terminal one which is often erect; spikelets 7-33 (-45), linear-lanceolate, 3.5-7 × 0.7-1.2 mm, rhombic, acuminate, cuneate at base, with 4-8 florets, the scales slightly spreading; fertile scales ovate-elliptic, 1.5-2 × 1.2-1.6 mm, dorsally acute, thinly herbaceous, smooth, glabrous, yellow-brown, margins broadly scarious, carina 3-nerved, greenish, prolonged beyond the obtuse to acute apex as a short, slightly excurved mucro, lateral nerves distinct, coarse, 4-5 on each side; rachilla broadly hyaline-winged. Stamens 3, the anthers 0.3-0.5 mm long, rounded-apiculate; style 3-branched. Achene trigonous, ovoid-ellipsoid, 1.1-1.4 × 0.5-0.7 mm, with plane to slightly concave sides, curvate adaxially, short-cuneate, short-apiculate, obtuse at base, puncticulate, brown to brown-black.

General distribution: Cuba, Hispaniola, Jamaica, Puerto Rico, and the Virgin Islands.

Distribution in Puerto Rico and the Virgin Islands: Known only from the southwestern region of Puerto Rico along coastal areas on rocky slopes, ravines, and sea shores. Lajas and Yauco; St. Croix.

Note: Cyperus subtenuis was described as a variety of *Cyperus nanus* Willd. by Kükenthal (1936) and is closely related to it. However, it consistently differs from the latter in its coarser habit, spikelet scales 1.5-2 × 1.2-1.6 mm and 4- to 5-nerved (vs. 1.2-1.6 × 0.8-1 mm and 3- to 4-nerved), and achenes which are ovoid-ellipsoid, 1.1-1.4 × 0.5-0.7 mm with curvate adaxial side (vs. oblong-ellipsoid, 1-1.2 × 0.5-0.6 mm, and straight adaxial side) and is therefore treated here at the specific level.

Selected specimens examined: PUERTO RICO: Lajas: Bo. Parguera, *McKenzie s.n.* (SJ); *Proctor 44138* (SJ). Yauco: *Stevens & Hess 3309* (NY).

37. Cyperus surinamensis Rottb., Descr. Pl. Rar. 20. 1772. Type: Surinam. *Rolander s.n.* (holotype: probably at C-Rottb.).

Caespitose perennial, (5-) 20-90 (-120) cm tall; rhizome short, becoming thickened and knotty. Culms 2-6, caespitose or arising at short intervals along the rhizome, trigonous, scabrous distally with scattered retrorse and antrorse barbs, nearly smooth proximally, (1-)2-4 (-4.5) mm wide, sheathing base of culm (3-) 4-7 (-12) mm wide. Leaves 3-9, primarily basal, several sometimes lower cauline; sheaths short, cross-veined, pale green to brownish, the inner band finely-veined; ligule absent; blades flattened or folded, (6-) 12-45 (-65) cm × 2-5 (-6.5) mm, with antrorsely scabrous or scaberulous margins and abaxial midvein, acuminate to triquetrous apex. Inflorescence a compound, open to subcontracted, umbel-like corymb with ascending rays, (2-)5-18 cm diam.; involucral bracts (3-) 4-10, leaf-like, the lowermost ones to 50 cm long, the uppermost short, linear-setaceous; rays (3-) 4-17 (-25), very unequal, the primary ones to 15 cm long, stiff, ascending, the secondary ones 3-6, 1-2 cm long, divergent to reflexed at maturity; spikes broadly ovate to hemispherical or subrounded, 5-18 (-20) mm diam., with 6-50 (-90) densely disposed digitately arranged spikelets; spikelets ovate, oblong-ovate or oblong-lanceolate, distinctly flattened, (3-) 4-8 (-12) × 1.5-2 mm (3-5 mm long if denuded rachilla excluded), acute at apex, widely obtuse to sub-rounded at base, with (9-) 11-31 (-45) florets (5-22 florets if denuded rachilla excluded); rachilla unwinged; scales oblong-ovate to lanceolate, curvate-keeled, dorsally acute, 1.2-1.5 × 0.7-0.9 mm, membranous, minutely reticulate, pale yellow, pale brown, or reddish brown, carina 3-nerved, 2-keeled near base, greenish, prolonged beyond the acute apex as a short barb-tipped mucro. Stamen 1, the anther 0.7-0.8 mm long; style 3-branched to below the middle. Achene trigonous with plane to slightly convex faces, narrowly ovate-ellipsoid to narrowly oblong-ellipsoid, 0.8-0.9 × 0.3 mm, acute at apex, apiculate, obtuse at base, short-stipitate, shiny, papillate, indistinctly rugulose, brown to reddish brown.

General distribution: Southeastern United States, West Indies, Mexico, Central America, and South America.

Distribution in Puerto Rico and the Virgin Islands: Wet or moist areas; in sandy or gravelly soils of lake and pond margins, river and stream edges, marshy or swampy areas, meadows, sandy savannas; roadside ditches, coastal areas, pastures, agricultural fields, and waste areas. Primarily at lower elevations, along roadsides at higher elevations. Aguada, Aibonito, Añasco, Arecibo, Arroyo, Bayamón, Cabo Rojo, Caguas, Camuy, Carolina, Cataño, Ceiba, Dorado, Fajardo, Guayama, Humacao, Juana Díaz, Loíza: Luquillo, Manatí, Maunabo, Mayagüez, Morovis, Naguabo, Patillas, Río Grande, Río Piedras, San Juan, San Lorenzo, Toa Baja, Utuado, Vega Alta, Vega Baja, Vieques, and Yabucoa; St. John and St. Thomas.

Selected specimens examined: PUERTO RICO: Añasco: Hwy. Mayagüez to Moca, km 145.2, *González-Más 1782* (US). Arroyo: Playa de Guilarte, *González-Más 1312* (US). Bayamón: *N.L. Britton 2346* (US). Carolina: Sabana Abajo, near Carolina, *N.L. Britton & Brown 5710* (US). Cataño: Rd. 165, km 5, *González-Más* 1155 (US). Dorado: *Johnston 884* (US). Fajardo: *Sintenis 1256* (US). Guayama: Along Rd. 179, NE of Guayama, near km 14, *Stimson 1739* (US). Humacao: Pozal, Playa de Humacao, *Eggers 594* (US). Juana Díaz: Rd. 14, Guayabal, *González-Más 770* (US). Manatí: Bo. Tierras Nuevas Saliente, area 0.7-1.4 km E of Rd. 686 at Baldwin School (SE of El Pulguero), *Proctor & Díaz 42159* (US). Mayagüez: Guanajibo, Rd. 102, Puente Río Estero, *González-Más 821* (US). Naguabo: Sierra de Luquillo, Caribbean National Forest, *Proctor & Thomas 43203* (US). San Juan: Río Piedras Exp. Station, *Johnston 776* (US). Vega Alta: Bo. Sabana, silica-sand area NE of Regadera, *Proctor & Concepción 41845* (US); Laguna San José, *Hioram 374* (US).Vega Baja: Laguna Rica, near Camp Tortuguero National Guard, off Rt. 687, *Strong et al. 429* (GMUF). Vieques: Isabel Segunda to Sierra Encantada, *Shafer 2524* (NY). Yabucoa: Rd. 3, km 96.2, *González-Más 1343* (US). ST. JOHN: Herman Farm, *Woodbury 457/6911* (VINPS). ST. THOMAS: Nazareth, *Acevedo-Rdgz. 11304* (FTG).

38. Cyperus swartzii Boeck., Beitr. Cyper. 1: 10. 1888; *Kyllinga filiformis* Sw., Prodr. 20. 1788, [non *Cyperus filiformis* Sw., 1788]; *Mariscus filiformis* Spreng., Syst. Veg. 1: 234. 1824; *Mariscus swartzii* A. Dietr., Sp. Pl. 2: 343.

1833, *nom. illeg.* Type: Jamaica. *Swartz s.n.* (holotype: S-Sw., R-3118).

Mariscus gracilis Vahl, Enum. Pl. 2: 373. 1805, [non *Cyperus gracilis* R. Br., 1810]. Type: South America. *Richard s.n.* (holotype: C-Vahl).

Kyllinga granularis Desf. ex Boeck., Linnaea 35: 432. 1868; *Cyperus granularis* (Desf. ex Boeck.) Britton, Bull. Torrey Bot. Club 43: 44. 1916. *Cyperus swartzii* var. *granularis* (Desf. ex Boeck.) Kük., Repert. Spec. Nov. Regni Veg. 23: 186. 1926. Type: Hispaniola; collector unknown. (holotype: B-Willd. 1443, which stems from Desfontaines).

Cyperus swartzii var. *elongatus* Kük., Repert. Spec. Nov. Regni Veg. 23: 187. 1926. Syntypes: Cuba. *Ekman 10989* (B, destroyed); Puerto Rico. *Sintenis 3808* (B, destroyed).

Caespitose perennial (1-) 5-56 (-70) cm tall; rhizomes short, knotty, thickened, or often horizontal, 2-3 mm thick. Culms densely to loosely tufted, slender, filiform-triquetrous with obtuse to rounded angles, finely ribbed, medially channeled, smooth or essentially so, 0.5-1.3 (-1.5) mm wide, sheathing bases 1-2 mm wide. Leaves 3-6, basal, the lowermost bladeless; sheaths light brown or reddish brown, reddish or purplish dotted adaxially and on membranous inner band; ligule absent; blades narrowly linear, V-shaped proximally to plicate or subflattened distally, 8-30 cm × 1-3 mm (flattened), finely antrorsely scabrous on the margins and abaxial midvein at least distally, long-attenuate to triquetrous apex. Inflorescence a contracted to open, umbel-like corymb with short ascending rays or often reduced to a single head-like cluster of 2-5 (-6) spikes, 4-40 mm in diam; involucral bracts 3-4 (-5), leaf-like, the lowermost ones erect or strongly ascending, 2-15 (-19) cm long, the others ascending to spreading; rays 1-3, short, to 35 mm long, or absent; secondary rays absent; spikes ovoid to oblong-ovoid, 3-9 × 3-4 mm, with (6-) 16-60 densely disposed, spicately arranged spikelets; spikelets elliptic-obovoid, scarcely compressed, (1-) 1.4-2.3 × 0.6-1.3 mm, quadrate-rhombic, acute to short-acuminate at apex and base, with 1 floret; rachilla broadly hyaline-winged; fertile scale ovate, dorsally acute, 1.4-2 × 1.4-1.8 mm, submembranous, 6-8 nerved above the scarious inrolled margins, light brown to tan or yellowish or reddish brown, reddish lineolate, carina 3-nerved, the medial one coarse, greenish brown, prolonged above the obtuse apex as a short slightly recurved mucro; terminal scale reduced, sterile, dorsally gibbous or pouched medially along carina. Stamens 3, the anthers 0.3-0.6 mm long, apiculate; style 3-branched. Achene trigonous with slightly convex faces, elliptic-obovoid, 1-1.3 × 0.6-0.9 mm, obtuse at apex, apiculate, cuneate at base, short-stipitate, puncticulate, dark brown or blackish.

General distribution: Greater and Lesser Antilles, and known from a single collection made in San Luis Potosí, Mexico.

Distribution in Puerto Rico and the Virgin Islands: Known only from the southwestern region in Puerto Rico in open to shaded moist clearings, pastures, pond borders, savanna, and hillsides. Guánica and Peñuelas; St. Croix.

Note: The following collections were cited by Kükenthal (1936) for *Cyperus swartzii* and its varieties: Guánica: *Sintenis 3808* (B). Peñuelas: *Sintenis 4742* (B). St. Croix: *Benzon s.n.* (B). These historical collections, all at Berlin (B), are probably now destroyed. No recent collections have been made from Puerto Rico or the Virgin Islands.

39. Cyperus tenuis Sw., Prodr. 20. 1788; *Mariscus tenuis* (Sw.) C. B. Clarke in Urban, Symb. Antill. 2: 48. 1900. Type: Jamaica. *Swartz s.n.* (lectotype: S-Sw. R-1386; isolectotypes: B-Willd. 1390, C, M, S). designated by G. C. Tucker, Syst. Bot. 11: 15. 1986.

Mariscus flabelliformis Kunth in Humb., Bonpl., & Kunth, Nov. Gen. Sp. 1 [quarto ed.]: 215. 1816. Type: Venezuela; Caracas. *Humboldt & Bonpland s.n.* (holotype: B-Willd. 1433) .

Cyperus platystachyus Griseb., Fl. Brit. W. I. 567. 1864. Type: Jamaica. Collector unknown (holotype: GOET).

Cyperus hartii Boeck., Beitr. Cyper. 1: 9. 1888. Type: Jamaica. *Hart s.n.* (holotype B, destroyed).

Caespitose perennial, 10-60 cm tall; rhizomes short, bulbous-thickened, 1-5 mm thick. Culms trigonous, often obtusely so, coarsely ribbed and channeled, slender but stiff, smooth, 0.7-1.8 (-2.2) mm wide, sheathing bases 2-5 mm wide. Leaves 3-6, basal and lower cauline; sheaths pale-stramineous, the lowermost stained with red or purple-brown; ligule absent; blades V-shaped proximally, flattened distally, 5-35 cm × (1-) 1.8-

3 (-4.2) mm, smooth, antrorsely scabrous on the margins and abaxial midvein, narrowly acuminate at apex. Inflorescence a contracted or sometimes open, simple, umbel-like corymb with ascending rays, 2-5 (-6.5) × 3-8 (-11) cm; involucral bracts 5-11, leaf-like, the lowermost to 42 cm long, spreading, ascending to horizontal; rays (2-) 5-12 (-14), elongating to 5 cm; secondary rays absent; spikes (2-) 3-11, loosely ovoid to oblong-ovoid, (10-) 15-25 (-35) × (8-) 10-25 mm, broadly rounded to subtruncate at apex, with (10-) 15-50 (-70) somewhat loosely disposed, spicately arranged spikelets; spikelets linear, 5-15 (-22) × 0.7-1.1 mm, compressed-quadrate, acuminate at apex, cuneate at base, with (2-) 4-11 (-20) florets; rachilla broadly hyaline-winged; scales narrowly elliptic, oblong-elliptic, or ovate-oblong, dorsally obtuse, 2.4-3.4 × (1-) 1.3-1.8 mm, membranous, laterally 3-7 nerved on each side above the broadly scarious involute margins, greenish white or pale stramineous, often reddish brown on sides, carina 3-nerved, green, prolonged beyond the broadly rounded apex as a short mucro. Stamens 3, the anthers 0.3-0.5 mm long, bluntly apiculate; style 3-branched. Achene trigonous with concave to barely convex faces, linear to narrowly oblong, slightly curved adaxially, (1.4-) 1.6-1.8 (-2) × 0.4-0.5 mm, subacute at apex, apiculate, cuneate at base, short-stipitate, punctate, brown to reddish brown.

General distribution: West Indies, Mexico, Central America, South America, and tropical Africa.

Distribution in Puerto Rico and the Virgin Islands: Roadsides and open disturbed areas. Dorado, Maricao, Mayagüez, and San Germán; St. Croix.

Selected specimens examined: PUERTO RICO: Dorado: Bo. Higuillar, Rd. 693, 2.1 km S of Dorado, *Proctor 42459* (US). Maricao: Maricao State Forest, *Liogier & Liogier 36778* (US); Bo. Maricao Afuera, vicinity, *Proctor & McKenzie 43836* (US).

40. Cyperus unifolius Boeck., Linnaea 36: 374. 1870. Type: St. Croix, U.S. Virgin Islands. *Ravn s.n.* (holotype: B, destroyed; isotype: probably at C).

Cyperus calcicola Britton, Bull. Torrey Bot. Club 42: 387. 1915. Type: Puerto Rico; Caja de Muertos. *N. L. Britton et al. 4976* (holotype: NY!; isotypes: UPR!, US!).

Caespitose perennial, (3-) 6-40 (-45) cm tall; rhizome short, nodose; roots aromatic. Culms tufted, firm, filiform, subcompressed, obtusely triquetrous, finely ribbed, smooth proximally, antrorsely scabridulous distally at apex, 0.3-0.8 mm wide, sheathing base of culm 0.5-1.5 mm wide. Leaves 1-3, basal; sheaths elongate, pale reddish green to red with dark red veins, the lowermost often bladeless or with short blades; ligule absent; blades short, narrowly to broadly U-shaped proximally, involute distally, adaxially cellular-reticulate and spongy-thickened, often with a medial ridge, glossy, whitened or greenish, abaxially green, the midvein indistinct, 0.4-18 cm × 0.3-1.3 (-1.5) mm, antrorsely scabrous on the margins, attenuate to apex. Inflorescence a single, pseudolateral spike, or rarely 1-2 smaller, lateral, secondary ones present near its base, (5-) 6-14 (-20) mm in diam.; involucral bracts (1-) 2-3, leaf-like, the lowest well-developed, erect and appearing as a continuation of the culm, exceeding the inflorescence, the upper bracts setaceous, often divergent to reflexed; rays essentially absent; spikes 1 (-3), small, with (1-) 4-36 (-43) densely disposed spikelets; spikelets linear-subquadrate, flexuose, 3-10 (-13) × 0.8-1.5 mm, acuminate at apex, cuneate at base, with 3-12 florets; rachilla flexuose, broadly hyaline-winged; scales widely ovate-elliptic, dorsally acute, concavely curvate-keeled, 1.6-2.5 × 1.4-2 mm, subherbaceous, with 7-9 fine and indistinct nerves on each side above the scarious margins which clasp the achene at maturity, stramineous or yellowish or reddish brown, carina 3-nerved, greenish, prolonged beyond the subobtuse to acute apex as a short mucro. Stamens 3, the anthers 0.4-0.7 mm long, apiculate; styles 3-branched. Achene trigonous with plane faces, curvate on adaxial face, narrowly ellipsoid to ellipsoid-obovoid, 1.1-1.5 × 0.5-0.8 mm, sub-rounded at apex, apiculate, short-cuneate at base, estipitate, puncticulate, brown to dark brown at maturity.

General distribution: Endemic to Puerto Rico and the Virgin Islands.

Distribution in Puerto Rico and the Virgin Islands: Primarily in the southwest region of Puerto Rico on limestone in dry scrub forest, thickets, and beaches along the coast. Cabo Rojo, Caja de Muertos, Guánica, Guayama, Guayanilla, Lajas, Mona Island, Ponce, San Juan, and Yauco; Anegada, Guana Island, St. Croix, and Tortola.

Common name: Puerto Rico: *Pajón de costa.*

Selected specimens examined: PUERTO RICO: Cabo Rojo: Bo. Boquerón, N end, Balneario Público de Boquerón, *Proctor & McKenzie 43752* (US).Guayanilla: Guánica State Forest, *Proctor 43386* (US). Guayama: Caja de Muertos, *N.L. Britton et al. 4976* (UPR). Mona Island: Sardinera, *Otero & Chardón 941* (US); Along E side of island, *Proctor & Haneke 43112* (US). Yauco: Bo. Barina, Guánica Forest Reserve, *Axelrod et al. 10897* (UPRRP). TORTOLA: Guana Island, *Proctor 43700* (US).

41. Cyperus unioloides R. Br., Prodr. 216. 1810; *Pycreus unioloides* (R. Br.) Urb., Symb. Antill. 2: 164. 1900. Type: Australia; Queensland. *R. Brown 5900* (holotype: BM; isotype: K).

Cyperus bromoides Willd. ex Link, Jahrb. Gewächsk. 3: 85. 1820. Type: South America. *Humboldt s.n.* (holotype: B-Willd. 1353).

Cyperus angulatus Nees in Wight, Contr. Bot. India. 73. 1834; *Pycreus angulatus* (Nees) Nees, Linnaea 9: 283. 1835. Type: Nepal. *Wallich 3324 a,b* (holotype: K).

Cyperus pseudobromoides Boeck., Linnaea 35: 464. 1868. Syntypes: Nepal; Hispaniola. Not located.

Caespitose perennial, (20-) 40-120 (-140) cm tall; rhizome short, 3-8 mm thick; roots coarse, yellowish or orangish. Culms triquetrous or subtrigonous proximally, the sides flat to concave, smooth, 1.3-3.5 mm wide; sheathing bases 3-8 mm wide. Leaves (1-) 2-5 (-6), basal; sheaths elongate, becoming fibrillose with age, brown to dark reddish brown, the inner band finely veined; ligule absent; blades flat or folded, often spiraling, 10-60 (-90) cm × 2.5-5 mm (unfolded), antrorsely scabrous on margins and midvein abaxially towards apex, smooth to remotely antrorsely scabrous adaxially, long-acuminate to triquetrous apex. Inflorescence a simple to rarely compound umbel-like corymb with ascending rays, 4-12 × 3-10 cm; involucral bracts 1-4, leaf-like, 7-40 (-60) cm long; rays (1-) 2-5 (-7), unequal, patent, up to 11 cm long, the tubular prophylls dark reddish brown, at least near base; spikes 2-4 × 2.2-3.5 cm, with 3-17 (-30) spicately disposed spikelets; spikelets lanceolate to ovate-lanceolate or oblong-lanceolate, flattened, 7-22 (-27) × 3-5 mm, acute at apex, obtuse at base, with 7-25 (-33) florets; rachilla quadrangular, unwinged, the scales and achenes deciduous from the rachilla at maturity; scales ovate to ovate-lanceolate, dorsally acute, 3-5 × 2-2.6 mm, light-brown to yellowish brown on sides, pale brown and often reddish brown lineolate on either side of carina, sometimes tinged with dark brown basally, 1-nerved on each side paralleling carina above the entire to distally narrowly scarious, involute margins, carina 3-nerved, greenish, prolonged beyond the acute apex as a short mucro. Stamens 3, the anthers 2-2.8 mm long, rounded-apiculate at apex; styles 2-branched. Achene biconvex, obovate to suborbicular, 1.1-1.3 × 0.8-1.1 mm, rounded to a short-beaked apex, short-cuneate at base, estipitate, outer epidermal layer shiny, smooth, silvery-gray, reticulate when mature, the inner surface minutely papillose, dull, blackish.

General distribution: Pantropical. Greater Antilles, Mexico, Central America, South America, Africa, Malesia, and Australia.

Distribution in Puerto Rico: In swamps or marshy areas; known only from Río Abajo State Forest and vicinity in northwestern Puerto Rico. Arecibo, Lares, and Utuado.

Selected specimens examined: PUERTO RICO: Arecibo: Bosque de Río Abajo, *Acevedo-Rdgz. et al. 2259* (NY, US); Río Abajo Forest Reserve, area S of Rt. 521, ca. 1.2 km W of Reserve office, *Axelrod et al. 10915* (UPRRP, US). Lares: *Sargent 3250* (US). Utuado: Bosque de Río Abajo, Saltillo, *Acevedo-Rdgz. 332* (SJ).

42. Cyperus urbanii Boeck., Beitr. Cyper. 1: 10. 1888; *Mariscus urbanii* (Boeck.) C. B. Clarke in Urban, Symb. Antill. 2: 47. 1900. Lectotype: Puerto Rico; Aibonito. *Sintenis 2929* (NY!), here designated.

Caespitose perennial, 4-50 cm tall; rhizome short; roots fine. Culms ascending, often arched, triquetrous, soft, flexuous, antrorsely scabrous on margins, finely ribbed, 0.3-0.9 mm wide. Leaves 3-5, ascending, basal and lower cauline; sheaths short, subinflated, thinly herbaceous, light brown to brown, often reddish tinged, with dark red veins; ligule absent; blades narrowly linear, V-shaped to folded proximally, flattened distally, 4-40 (-53) cm × (1-) 1.2-3 mm, herbaceous, finely and closely veined, semi-glossy and cellular-reticulate adaxially, at least proximally, margins and abaxial midvein with both antrorsely and retrorsely set

barbs, attenuate to triquetrous tip. Inflorescence a single, terminal, or a terminal and 1-2 lateral essentially sessile spikes at the summit of the culm, (4-) 4.5-8 (-11) × 4-7 (-9) mm; involucral bracts 3-5, the lowermost leaf-like, 1-14 cm long, uppermost short, linear-setaceous, ascending to divergent at maturity; spikes ovoid to oblong-ovoid, with 16-40 (-80) spikelets; spikelets oblong-ovoid, compressed-quadrate, (1.7-) 2-3.5 (-4) × 0.7-1 mm, acuminate at apex, short-cuneate at base, with 2-4 florets; rachilla hyaline-winged; scales widely ovate-elliptic to subrounded, 1.4-1.7 × 1.1-1.5 mm, dorsally acute, submembranous, whitish stramineous with blackish longitudinal lineations, 5- to 9-nerved on sides, margins scarious proximally, rounded to an abruptly acute to short-acuminate apex, carina 3-nerved, green, ending in a excurved cusp at apex. Stamens 3, the anthers 0.4-0.5 mm long, apiculate; style 3-branched. Achene trigonous, ellipsoid-obovoid, with the adaxial face plane to slightly concave and abaxial faces slightly convex, 1-1.4 × 0.6-0.7 mm, obtuse at apex, apiculate, short-cuneate at base, estipitate, finely puncticulate with an often faintly mottled surface, light brown to brown.

General distribution: Endemic to Puerto Rico.

Distribution in Puerto Rico: In upland habitats (150-830 m) on rocky shaded slopes, ridges, hillsides, and pastures. Aibonito, Cabo Rojo, Coamo, Salinas, and Vieques.

Selected specimens examined: PUERTO RICO: Coamo: Bo. Santa Catalina, Rte. 155, *Axelrod et al. 1567* (US); Bo. Cuyón, N slopes of Las Piedras Chiquitas, *Proctor & Carrasquillo 42486* (US); Las Piedras Chiquitas, Bo. Cuyón, along spur from house at Rt. 717, km 2.1 to ridge of peaks, *Axelrod & Sastre 5596* (US).

43. Cyperus virens Michx., Fl. Bor.-Amer. 1: 28. 1803. Type: United States; "Carolina". *Michaux s.n.* (holotype: P; photo at GH).

Cyperus formosus Vahl, Enum. Pl. 2: 327. 1805; *Cyperus surinamensis* var. *formosus* (Vahl) Kük., Repert. Spec. Nov. Regni Veg. 32: 74. 1933. Type: "Habitat in Louisiana et Caribaeis" *Collector unknown* (holotype: P-Juss.; isotype C-Vahl).

Caespitose, often coarse perennial, (20-) 55-140 (-170) cm tall; rhizome short, thick and hardened, 0.5-1 cm thick; roots coarse. Culms erect, triquetrous with sharply acute angles, firm but subspongy, predominantly antrorsely scabrous on angles, sometimes retrorse or extrorse barbs intermixed, (2-) 3-7 (-10) mm wide; sheathing bases 6-16 (-30) mm wide. Leaves 4-12, basal and lower cauline; sheaths relatively short, cross-veined, subspongy-thickened proximally, pale brown, tinged with red proximally; ligule absent; blades linear, V-shaped proximally, subflattened or subplicate distally, (10-) 30-130 cm × 4-14 mm, conspicuously cross-veined abaxially, margins and abaxial midvein scabrous with fine antrorse, retrorse or extrorse barbs often intermixed, long-acuminate to triquetrous apex. Inflorescence a simple to compound, somewhat open or often contracted, umbel-like corymb with ascending rays, 4-10 (-16) × 4.5-16 cm; involucral bracts 4-14, leaf-like, ascending to spreading, 13-70 (-100) cm long; primary rays 6-12, short to elongate, up to 12 (-14) cm long, secondary rays often present, shorter, several tertiary rays sometimes present; spikes ovoid, 1-2.5 cm in diam., with 8-40 digitately disposed, densely clustered spikelets; spikelets narrowly ovate to oblong-lanceolate, 4-8 (-10) × 2-3.2 mm (excluding denuded rachilla), compressed, obtuse at apex, broadly acute at base, with 10-22 florets; rachilla unwinged; scales lanceolate-elliptic, 1.6-2.3 (-2.8) × 1-1.4 mm, boat-shaped, dorsally 2-keeled, herbaceous or thickly so medially, glossy with a finely cellular-reticulate or -pebbled surface, pale reddish brown or greenish, dark reddish lineolate adaxially, with 1 distinct or sometimes indistinct nerve on each side above the scarious margins, carina 3-nerved, the lateral nerves forming two pronounced keels proximally creating a declivity between each lateral keel and the midnerve, all three nerves converging into a single one at the acute apex, there prolonged as a short mucro, greenish or brownish, glabrous or occasionally scabrellate distally. Stamens 1-2, the anthers 0.8-1.4 mm long, with a linear-prickly appendage at tip; style 3-branched. Achene trigonous, with flat or slightly convex or concave faces, ovoid-ellipsoid or ellipsoid, 1-1.5 × 0.3-0.6 mm, gradually tapered to an acute apex, subulate-beaked, short-cuneate at base, slightly to distinctly short-stipitate, finely puncticulate, brown to grayish brown.

General distribution: Southeastern United States, Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico: In wet or swampy areas along river banks, pond borders, pastures, and ditches. Bayamón, Fajardo, San Juan, and Toa Baja.

Selected specimens examined: PUERTO RICO: Bayamón: Finca Santa Ana, *Hioram 230* (US). Toa Baja: Rd. 866, km 7.2, to Punta Salinas, *González-Más 1144* (US).

Excluded species

Cyperus cuspidatus Kunth in Humb., Bonpl., & Kunth., Nov. Gen. Sp. 1 [quarto ed.]: 204. 1816. Reported for Anegada by Britton and P. Wilson (Bot. Porto Rico 5: 82. 1923). This record is based on a misidentification of a specimen of *Cyperus squarrosus* from Anegada.

Cyperus ferrugineus Poir. in Lamarck, Encycl. 7: 261. 1806. Cited by C. B. Clarke (in Urban, Symb. Antill. 2: 18. 1900) for St. Thomas as *Pycreus ferrugineus* (Poir.) C. B. Clarke based on a specimen (no collector given) at the British Museum (BM). Kükenthal (1936: 374) cites this, but treats it as *Cyperus filicinus* Vahl. *Cyperus ferrugineus* is strictly an African species and *C. filicinus* has not been recorded outside of the United States. No specimens have been seen of either taxon from Puerto Rico or the Virgin Islands in the preparation of this treatment.

Cyperus hermaphroditus (Jacq.) Standl., Contr. U.S. Natl. Herb. 18: 88. 1916. The specimen record for this species (*Sintenis 1256b* from Fajardo, Puerto Rico) was treated as *Mariscus elatus* Vahl by C. B. Clarke (in Urban, Symb. Antill. 2: 46. 1900), *Mariscus incompletus* (Jacq.) Urb. by Urban (Symb. Antill. 4: 13. 1903), and *Cyperus coriifolius* Boeck. by Kükenthal (in Engler, Pflanzenr. IV, 20 (Heft 101): 492. 1936) who treated this latter taxon as distinct from *C. hermaphroditus*. However, Kükenthal (l.c. 492) doubts its occurrence in the West Indies. This specimen was not seen by McLaughlin (1944) nor located by us in order to confirm its identity.

Cyperus humilis Kunth, Enum. Pl. 2: 23. 1837. Reported for Anegada by D'Arcy in "Anegada Island: Vegetation and Flora", Atoll. Res. Bull. No. 188: 15. 1975, based on *D'Arcy 4906A* (MO!). This specimen is *Cyperus squarrosus* L.

Cyperus retroflexus Buckley, Proc. Acad. Nat. Sci. Philadelphia 14: 9. 1862. Reported for Puerto Rico by Kartesz (1998) in his "A Synonymized Checklist of the Vascular Flora of the United States, Puerto Rico, and the Virgin Islands" (http://www.csdl.tamu.edu/FLORA/b98/check98.htm). However, no specimen record exists to confirm its identity (Kartesz, pers. comm., 2001).

Cyperus luzulae (L.) Rottb. ex Retz., Observ. Bot. 4: 11. 1786. C. B. Clarke (in Urban, Symb. Antill. 2: 28. 1900) cited this taxon for Puerto Rico based on a collection of *Bertero s.n.* This taxon was later reported for Puerto Rico by Britton and P. Wilson (Bot. Porto Rico 5: 84. 1923) based on *Bertero s.n.* (near Bayamón) and *Hioram s.n.*; Kükenthal (in Engler, Pflanzenr. IV, 20 (Heft 101): 170. 1936) without any citation given; and *McLaughlin* (1944: 51) based on *Fredholm 4722*. The *Hioram* and *Fredholm* specimens are *Cyperus surinamensis* Rottb. Neither the *Bertero* specimen, or any other collection of this taxon was seen by us in order to confirm its occurrence in Puerto Rico.

6. ELEOCHARIS

Eleocharis R. Br., Prodr. 224. 1810.

Perennials or occasionally annuals, rhizomatous, stoloniferous, or tufted; culms usually cylindrical, sometimes trigonous, rarely quadrangular, solid or hollow, sometimes transversely septate, smooth, green, glabrous. Leaves reduced to bladeless sheaths; sheaths closed, tubular, the orifice truncate to obliquely truncate, dorsally carinate, the carina often prolonged as a short apiculum, sometimes with a puckered, scarious appendage above the apex, glabrous. Inflorescence a single, terminal spikelet at the summit of the culm; spikelets ovoid to lanceoloid, rarely obovoid, obtuse to acute, several- to many-

flowered, with spirally imbricate or sometimes subdistichous scales, the lowermost 1-2 sterile; scales oblong, oblong-ovate to lanceolate, or obovate, sometimes subrounded, firm or membranous, usually with hyaline margins, carinate or sometimes indistinctly so, nerved or nerveless on sides, glabrous. Flowers bisexual; perianth bristles present or rarely absent, (3-) 6 (-12), retrorsely barbed, rarely smooth; stamens (2) 3, the anthers elliptic to linear; styles capillary, 2- or 3-branched, with expanded base. Achene trigonous or biconvex, obovate or elliptic, smooth, cancellate, or cellular-reticulate; style base expanded, triangular or conical, sometimes spongy-thickened, persistent at the apex of the achene. A cosmopolitan genus with approximately 250 species.

LECTOTYPE: *Eleocharis palustris* (L.) Roem. & Schult. (≡ *Scirpus palustris* L.), designated by Britton, Bull. Dept. Agric. Jamaica 5, Suppl. 1: 10. 1907.

References: Svenson, H. K. 1929. Monographic studies in the genus *Eleocharis*. Rhodora 31: 224-242; Svenson, H. K. 1939. Monographic studies in the genus *Eleocharis*. Rhodora 41: 1-77, 93-110.

Key to the species of *Eleocharis*

1. Spikelets linear-cylindrical; spikelet scales firm, subcartilaginous (at least medially), rounded-obovate or subrounded, generally ca. as long as broad..... 2
   2. Culms appearing nodose with conspicuous transverse septae ..... 7. *E. interstincta*
   2. Culms appearing smooth, without conspicuous transverse septae..... 3
      3. Culm sharply trigonous, rarely obtusely so; bristles retrorsely barbed their entire length ..... 10. *E. mutata*
      3. Culms terete or essentially so; bristles smooth or sometimes several retrorse barbs present at apex ..... 1. *E. cellulosa*

1. Spikelets ovoid, lanceoloid, or obovoid; spikelet scales thin, membranaceous or herbaceous, ovate, ovate-lanceolate, ovate-elliptic, oblong-ovate, oblong-elliptic, or obovate to spatulate, generally longer than broad..... 4
   4. Culms appearing nodose with conspicuous transverse septae..... 5
      5. Culms (1.3-) 2-10 mm wide; spikelets (3-) 4-9 mm wide; scales obovate to spathulate with an oblong limb, abruptly broadly obtuse or rounded to apex; achenes 1-1.5 × 0.5-0.7 mm; style base lanceolate, 0.7-1 mm long; bristles 6-8 ..... 3. *E. elegans*
      5. Culms 1-2.5 mm wide; spikelets 2-4 mm wide; scales ovate to ovate-lanceolate, tapering to slightly dialated apex; achenes 0.9-1.1 × 0.6-1 mm, style base deltate to depressed-deltate, 0.3-0.4 mm long; bristles 4-6 ..... 9. *E. montana*
   4. Culms appearing smooth, without conspicuous transverse septae..... 6
      6. Style 2-branched; achenes biconvex..... 7
         7. Mature achenes finely reticulate, dull, yellowish ..... 4. *E. fallax*
         7. Mature achenes smooth and shiny, black or brown..... 8
            8. Summit of sheath conspicuously whitish hyaline and cross-puckered above the orifice; mature achene brown ..... 5. *E. flavescens*
            8. Summit of sheath firm, or hyaline with a slender green carina dorsally, not conspicuously cross-puckered above the oblique or subtruncate orifice; mature achenes black..... 9
               9. Caespitose annual or short-lived perennial not forming basal spikelets; spikelets subglobose or ovoid, 2.5-4 mm long; fertile spikelet scales herbaceous, elliptic, 1.5-2 mm long, dark green to brown with pale margins; wide-ranging, lowland, coastal plain species ..... 6. *E. geniculata*
               9. Caespitose perennial, often with horizontally creeping rhizomes bearing sessile basal spikelets; spikelets ovoid-ellipsoid to ellipsoid-lanceoloid, 3.5-7 (-9) mm long; fertile spikelet scales membranous, ovate to oblong-ovate, 2-3 mm long, stramineous, often purple to purplish brown on sides medially; upland, montane species, restricted to Sierra de Luquillo and Sierra de Naguabo, 450-1065 m ..... 2. *E. debilis*

6. Style 3-branched; achene trigonous or compressed-trigonous..... 10
10. Achenes terete or nearly so, narrowly oblong or oblong-obovoid, the surface with longitudinal ridges separated by numerous cross-walls (trabeculae) ..... 13. *E. radicans*
10. Achenes trigonous or compressed-trigonous, obovoid, the surface smooth or cancellate. 11
11. Spikelet narrowly obovoid or obconical ..... 12. *E. pachystyla*
11. Spikelet ovoid to oblong-ovoid, ovoid-ellipsoid, or lanceoloid..... 12
12. Medium-sized perennial, not forming basal spikelets; culms (0.5-) 0.7-1.8 (-2.2) mm wide; style base nearly confluent with summit of achene, seemingly a continuation of it but of a slightly different texture ..... 15. *E. rostellata*
12. Slender, delicate annuals or perennials, often forming sessile spikelets at culm bases; culms 0.2-0.4 (-0.5) mm wide; style base triquetro-pyramidal. 13
13. Achenes conspicuously cancellate; style base decurrent on shoulders of achene ..... 14. *E. retroflexa*
13. Achenes smooth or faintly reticulate; style base articulate with apex of achene. 14
14. Spikelet scales dark purplish brown medially; achenes (including style base) 0.7-1 × 0.4-0.6 mm; bristles 3-6 or rudimentary ..... 11. *E. oligantha*
14. Spikelet scales stramineous, often faintly tinged with yellow-brown; achenes (including style base) 0.5-0.6 × 0.3-0.4 mm; bristles absent, rarely several rudimentary ones present ..... 8. *E. minutiflora*

1. Eleocharis cellulosa Torr., Ann. Lyceum Nat. Hist. New York 3: 298. 1836. Type: United States; Mississippi. *Ingalls s.n.* (holotype: NY!; isotype: GH).

Coarse stoloniferous perennial 30-80 (-125) cm tall; stolons elongate, stout, 2-3 mm thick, glossy, brown to chocolate-brown; roots coarse. Culms strongly ascending to erect, 3-5 mm wide, terete or obtusely angled, rarely trigonous, soft, spongy, easily compressed, with network of internal air cavities, very finely and shallowly ribbed, finely and bluntly antrorsely scabrous along ribs distally, greenish or stramineous. Proximal sheaths inflated or subinflated, submembranous, light green to stramineous, often tinged with brown or purple-brown distally; distal sheaths herbaceous, light green to light brown or stramineous, oblique at orifice, acute to broadly acute at apex with a long-subulate apiculum dorsally. Spikelets cylindrical, 1.5-4 (-5) cm × 3.2-4.5 (-5) mm, acute to obtuse or sub-rounded at apex, cuneate at base, many-flowered, the florets spirally imbricate; fertile scales obovate, subrounded, or widely ovate-rhombic, 3.5-4.7 (-5) × 2.7-4 (-4.5) mm, dorsally obtuse to rounded, obtuse at apex, thickly herbaceous to subcoriaceous medially, stramineous with a conspicuous or sometimes inconspicuous brown border and narrow white scarious margins, reddish lineolate and dotted adaxially, finely veined abaxially, carina and lateral nerves indistinct; sterile basal scales 1, similar to fertile, the lower margins broadly clasping base of spikelet. Stamens 3, the anthers 1.7-2.2 mm long, apiculate; style 3-branched. Achene biconvex, elliptic-obovate or widely elliptic, 1.5-2 × 1.3-1.5 mm, abruptly narrowed to a truncate, low rim-like apex that extends distally on margins of style base, cuneate at base, cellular-reticulate with 17-21 longitudinal rows of often transversely oriented rectangular cells, glossy, light brown to brown; style base trigonous, thickened medially, 0.5-0.8 mm long, 0.5-0.8 mm wide at base, subspongy, subconfluent with the thickened rim-like apex of achene; bristles 6-7, closely appressed to achene body, subflattened proximally, light brown, smooth to sometimes a few antrorse barbs present at tips, equaling or slightly longer than achene body.

General distribution: Southeastern United States, Mexico, Central America, and the West Indies.

Distribution in Puerto Rico: Occurring in north-central Puerto Rico only in shallow water or wet areas of lake margins, swales, and marshes. Manatí, San Juan, and Vega Baja.

Common name: Puerto Rico: *Junco fino.*

Selected specimens examined: PUERTO RICO: Manatí: Bo. Tierras Nuevas Saliente, area just S of Laguna Tortuguero, *Proctor 42687* (US).

2. Eleocharis debilis Kunth, Enum. Pl. 2: 143. 1837. Type: Brazil; Rio de Janeiro. *Sellow s.n.* (holotype: B, destroyed).

Eleocharis shaferi Britton, Mem. Torrey Bot. Club 16: 59. 1920. Type: Cuba; Oriente. *Shafer 3414* (holotype: NY!; isotype: NY!).

Eleocharis yunquensis Britton in Britton & P. Wilson, Bot. Porto Rico 5: 92. 1923. Type: Puerto Rico; Luquillo Mountains. *Britton & Bruner 7619* (holotype: NY!; isotypes: GH, UPR! US!).

Eleocharis atropurpurea sensu Urban, Symb. Antill. 4: 116. 1903, non (Retzius) J. Presl & C. Presl, 1828.

Eleocharis sintenisii of authors, non Boeckeler, 1888.

Rhizomatous perennial, 4-40 cm tall, often forming spikelets at culm bases; rhizomes slender, horizontally creeping or forming a dense mat; roots fine. Culms crowded along rhizome, often in dense, spreading clumps, erect to ascending, filiform, coarsely 4- to 6-ribbed, 0.3-0.7 mm wide. Sheaths subinflated, proximal ones membranous, purple to purple-black proximally, stramineous distally, distal sheaths thinly herbaceous, green to stramineous, often angled with 3-4 green marginal nerves, dorsally septate-nodulose distally, the orifice oblique to subtruncate, membranous, dorsally acuminate with green carina. Spikelets ovoid-ellipsoid to ellipsoid-lanceoloid, 3.5-7 (-9) × (1-) 1.3-2.7 (-3) mm, acute at apex, cuneate at base, 4- to 20-flowered with spirally imbricate florets, the scales spreading; fertile scales ovate to oblong-ovate, 2-3 × 1-1.5 mm, boat-shaped, acutely to obtusely keeled dorsally, stramineous, often purple to purplish brown on sides, finely striate, with a slender green carina ending short of the obtuse to acute apex, lateral nerves indistinct; sterile basal scales 1-2, ovate-elliptic, similar in size to fertile scales, herbaceous, obtuse to rounded at apex, the carina 3- to 5-ribbed, thickened distally. Stamens 2-3, the anthers 0.4-0.7 mm long, apiculate; style 2-branched. Achene biconvex, narrowly obovate, 1-1.4 × 0.6-0.8 mm, black, shining, finely and faintly transversely rugulose to essentially smooth; style base conical to conic-subulate, 0.4-0.6 mm long, 0.3-0.4 mm wide at base; bristles 6, unequal, whitish to light brown, retrorsely barbed from tip to near base, shorter than to equaling or exceeding the achene body.

General distribution: Cuba and Puerto Rico, Central America, and South America.

Distribution in Puerto Rico: Wet areas of montane forest, generally in higher elevations of the Sierra de Luquillo and Sierra de Naguabo, 450-1065 m; forest edges and openings, river banks, stream edges, creek and river beds, and roadside ditches. Ceiba, Naguabo, and Río Grande.

Selected specimens examined: PUERTO RICO: Ceiba/Naguabo: Caribbean National Forest, *Axelrod 8352* (US). Naguabo: Bo. Río Blanco, Caribbean National Forest, *Axelrod & Chávez 4122* (US); Sierra de Naguabo, vicinity of La Florida, *Shafer 3138* (US). Río Grande: Sierra de Luquillo, *Proctor 43192, 43200* (US); El Yunque, *McKee 10643* (US); Luquillo Forest, top of El Yunque, *González-Más 1532* (US); Luquillo Forest, Road towards El Yunque mountain, *González-Más 1540* (US).

3. Eleocharis elegans (Kunth) Roem. & Schult., Syst. Veg. 2: 150. 1817; *Scirpus elegans* Kunth in Humb., Bonpl., & Kunth, Nov. Gen. Sp. [quarto ed.] 1: 226. 1816. Type: Venezuela. *Humboldt & Bonpland s.n.* (holotype: P-HBK).

Eleocharis constricta Schult., Mant. 2: 87. 1824; *Scirpus constrictus* (Schult.) Griseb., Syst. Veg. Karaiben: 122. 1857. Type: Brazil. *Wied-Neuwied s.n.* (holotype: P).

Eleocharis geniculata sensu C. B. Clarke in Urban, Symb. Antill. 2: 74. 1900 and sensu Britton & P. Wilson, Bot. Porto Rico 5: 92. 1923, non (Linnaeus) Roem. & Schult., 1817.

Coarse, rhizomatous perennial, (10-) 30-150 (-170) cm tall; rhizome short, rarely elongated, ascending to horizontal, ligneous, 5-10 mm thick. Culms shortly ascending to erect, crowded along rhizome, (1.3-) 2-10 mm wide, terete, easily compressed, prominently transversely septate, the intervals between the septae 6-30 (-40) mm long proximally, becoming increasingly shorter distally, glaucous. Sheaths thinly herbaceous, finely veined, truncate at orifice, often with an inconspicuous subulate mucro dorsally, reddish to reddish purple, red-dotted, finely black-maculate

at apex. Spikelets lanceoloid to lanceoloid-ellipsoid, 7-30 × (3-) 4-9 mm, narrowly obtuse to acute at apex, truncate to broadly rounded at base, densely many-flowered, the florets spirally imbricate; fertile scales membranous, obovate to spathulate with an oblong limb, 2-3 × 0.7-1.5 mm, dorsally obtuse to rounded, pale, opaque brown to yellow-brown medially, margins broadly scarious, red-brown lineolate, obscurely 3-nerved medially, carina indistinct, ending short of the obtuse to sub-rounded apex; sterile basal scales 2-3, sub-rounded to deltoid, 1.5-2.5 × 2-3 mm, obtuse at apex, green, glaucous, with pale scarious margins. Stamens 3, the anthers 1-1.2 mm long, apiculate; style 2- or 3-branched. Achene biconvex to slightly trigonous, obovate-elliptic to elliptic, 1-1.5 × 0.5-0.7 mm, finely and shallowly reticulate with irregularly disposed, oblong or somewhat isodiametric cells, semi-glossy, yellow to yellow-brown; style base laterally compressed, lanceolate or deltate-lanceolate, 0.7-1 mm long, 0.3-0.5 mm wide at base, annular-thickened at base, articulate with apex of achene, brown to grayish brown; bristles 6-8, unequal, forming a short stipe at base of achene, subulate, brown, closely retrorsely spinulose nearly to base, exceeding achene, equaling to slightly overtopping apex of style base.

General distribution: Central Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico: In wet habitats, generally at middle to higher elevations, 100-1050 m; forest edges, marshy areas, margins of pools, springy depressions, edges of creeks, streams, riverbanks, meadows, pasture, cane fields, roadside ditches, and disturbed areas. Adjuntas, Aguadilla, Aguas Buenas, Aibonito, Añasco, Arecibo, Bayamón, Caguas, Cayey, Ceiba, Corozal, Fajardo, Humacao, Jayuya, Lares, Luquillo, Maricao, Mayagüez, Naguabo, Orocovis, Patillas, Ponce, Rincón, Río Grande, San Juan, San Lorenzo, Utuado, and Vega Baja.

Common name: Puerto Rico: *Junquillo.*

Selected specimens examined: PUERTO RICO: Adjuntas: Bo. Limaní, *Axelrod & Montalvo 11600* (UPRRP). Aibonito: *Sintenis 2915* (US). Añasco: *Heller 4534* (US). Arecibo; Río Abajo State Forest, *Acevedo-Rdgz. 10680* (US). Bayamón: *Hioram 311* (US). Caguas: *Underwood & Griggs 304* (US). Cayey: Rd. 184, Guavate, km 5.7, *González-Más 1578* (US). Maricao: Indiera Fría, near Maricao, *N.L. Britton et al. 4534* (US). Mayagüez: *N.L. Britton 2361* (US). Naguabo: Sierra de Naguabo, Mouth of Río Icaco, *Shafer 3164* (US). Patillas: Bo. Muñoz Rivera, off Rt. 184, *Axelrod & Weisel 11126* (UPRRP, US). Ponce: Hills above Ponce, *Sargent 383* (US). Río Grande: Along Rt. 186 bordering Caribbean National Forest, just N of the El Verde Field Station, *Strong et al. 380* (GMUF). San Juan: Río Piedras, *Heller & Heller 170* (US). Utuado: Vicinity of Utuado, *N.L. Britton & Cowell 416* (US).

4. Eleocharis fallax Weath., Rhodora 24: 23. 1922. Type: United States; Massachusetts. *Fernald & Long 18025*, (holotype: GH; isotype: US!).

Eleocharis nervosa Kük., Repert. Spec. Nov. Regni Veg. 23: 192, 1926. Type: Cuba; Santa Clara, Lagua la Grande, *Ekman 18543* (holotype: S; isotype: NY!).

Eleocharis ambigens Fernald, Rhodora 37: 394. 1935. Type: United States; Virginia. *Fernald & Long 3765* (holotype: GH).

Rhizomatous perennial, (10-) 20-70 (-80) cm tall; rhizomes elongate, horizontally creeping, slender, flexuous, reddish, 1-2.5 mm thick with dark red striate scales; roots medium to coarse. Culms in small tufts along rhizome, very slender, subterete or slightly compressed, 0.5-1.5 (-1.7) mm wide, shallowly ribbed, light green, often some cells with light reddish pigment giving the culms and sheaths a speckled appearance. Sheaths herbaceous, the lower purple-black (at least proximally) the upper light green, often tinged with red, orifice slightly oblique to subtruncate, short-mucronate dorsally, the margin slightly thickened, red-punctate when young, turning brownish with age. Spikelets ovoid-ellipsoid to lanceoloid, (6-) 7-10 (-16) × 1.5-3 mm, acute to obtuse or sub-rounded at apex, obtuse at base, many-flowered, the florets spirally imbricate; fertile scales ovate-elliptic or oblong-ovate to lanceolate, 2-3.7 (-4) × 1-1.6 mm, obtuse to sub-rounded at apex, thinly herbaceous to submembranous, dark brown to dark red on sides with green mid rib and broad pale scarious apex and margins; fertile basal scales 1-2, ovate to broadly ovate, like the fertile. Stamens 3, the anthers 0.6-1.5 mm long with a lanceolate appendage at apex bearing crystalline papillae; style commonly 2-branched, sometimes 3-branched, the branches scaly-fimbriate. Achene

biconvex to obtusely trigonous, obovoid, 1.2-1.7 × 0.8-1.1 mm, finely and shallowly reticulate, yellow to brown; style base obtusely pyramidal, with a collar-like ring at base, 0.4-0.6 mm long, 0.2-0.6 mm wide at base, wider at base than point of attachment, grayish; bristles 3-4 (-5), subulate, flattened proximally, reddish, retrorsely barbed from apex to near base, unequal, shorter than to 1-2 sometimes as long as achene body.

General distribution: Eastern United States and Greater Antilles.

Distribution in Puerto Rico and the Virgin Islands: Wet, muddy areas; lake borders, fields, and pastures. Guánica and Lajas; St. Croix.

Selected specimens examined: PUERTO RICO: Lajas: Bo. Palmarejo, NW corner of village of Maguayo, *Proctor 46385* (US).

5. Eleocharis flavescens (Poir.) Urb., Symb. Antill. 4: 116. 1903; *Scirpus flavescens* Poir. in Lamarck, Encycl. 6: 756. 1804. Type: Puerto Rico. *Ledrú s.n.* (holotype: P; isotype: P-2).

Scirpus flaccidus Rchb. ex Spreng. f., Tent. Suppl. 3. 1828; *Eleocharis albivaginata* var. *flaccida* (Rchb. ex Spreng. f.) Boeck., Linnaea 36: 437. 1869; *Eleocharis ocreata* var. *flaccida* (Rchb. ex Spreng. f.) Boeck. ex C. B. Clarke in Urban, Symb. Antill. 2: 63. 1900; *Eleocharis flaccida* (Rchb. ex Spreng. f.) Urb., Symb. Antill. 2: 165. 1900. Type: Surinam. *Weigelt s.n.* (holotype: B, destroyed).

Eleogenus ocreatus Nees in Martius, Fl. Bras. 2: 102. 1842. *Eleocharis ocreata* (Nees) Steud., Syn. Pl. Glumac. 2: 79. 1854; *Scirpus ocreatus* (Nees) Griseb., Pl. Wright. 2: 535. 1862. Type: Brazil. *Macrae s.n.* (syntype: CGE); *Macrae s.n.* (syntype: CGE); *von Martius s.n.* (syntype: M); and *Beyrich s.n.* (syntype: B, destroyed).

Eleocharis albivaginata var. *humilis* Boeck., Linnaea 36: 438. 1870; *Eleocharis ocreata* var. *humilis* (Boeck.) C. B. Clarke in Urban, Symb. Antill. 2: 64. 1900. Type: Puerto Rico. Collector unknown (holotype: B-Willd. 1162).

Stoloniferous perennial, (1-) 4-40 (-50) cm tall; rhizome horizontal to ascending, 0.6-1.2 mm thick. Culms caespitose or spaced singly along the rhizome, erect to ascending, subcompressed, 0.4-1 mm wide, prominently ribbed. Sheaths subloose, coarsely veined, membranous, green, red-tinged near base, with a prolonged, inflated, puckered, scarious, appendage above the apex, the apex short-mucronate dorsally. Spikelets ovoid to ovoid-ellipsoid, 3-7 × 1.5-3 mm, subacute, broadly cuneate at base, with many spirally imbricate florets; fertile scales boat-shaped, elliptic to narrowly-elliptic, 1.2-2.1 × 0.8-1.1 mm, broadly obtuse dorsally, pale green to stramineous, carina narrow, 3- to 5-nerved, subthickened at tip, ending short of the obtuse to subacute apex; sterile basal scale 1, narrowly-ovate, 1.4-2.2 × 1-1.2 mm, with broad finely and closely nerved, prominent, green carina which is thickened at apex. Stamens 3, the anthers 0.7-1 mm long, apiculate; styles 2-branched, the branches minutely scaly, the unbranched portion smooth. Achene biconvex, obovate, 0.8-1 (including style base) × 0.6-0.7 mm, smooth to finely cancellate, lustrous, olive brown to dark reddish brown; style base conic, 0.2-0.3 mm long, 0.2 mm wide at base, light brown; bristles 6-8, rarely absent, whitish to tawny, retrorsely barbed, equaling or exceeding the style base.

General distribution: United States (predominately southeastern), Mexico, Central America, West Indies, and northern and eastern South America.

Distribution in Puerto Rico and the Virgin Islands: In wet mud or peat of marshy or grassy areas, river banks, border of marshes, forest borders, depressions and trails in montane forest, pasture, roadside ditches and banks, and disturbed areas. Adjuntas, Aibonito, Añasco, Arecibo, Barranquitas, Bayamón, Caguas, Canóvanas, Cayey, Ceiba, Ciales, Dorado, Florida, Humacao, Jayuya, Juncos, Luquillo, Manatí, Maricao, Naguabo, Orocovis, Patillas, Río Grande, San Juan, San Lorenzo, San Sebastián, Utuado, Vega Alta, Vega Baja, and Villalba; St. Thomas.

Selected specimens examined: PUERTO RICO: Adjuntas: Monte Cerrote, near Adjuntas, *N.L. Britton & Brown 5405* (US). Añasco: *Heller 4532* (US). Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10732* (UPRRP, US). Bayamón: *Sintenis 1222* (US). Canóvanas: Sierra de Luquillo, *Proctor & Taylor 46297* (US). Cayey: Rd. 184, El Guavate, km 9.6, *González-Más 1575* (US). Juncos: *Sintenis* 2656 (US). Luquillo: Luquillo Forest (Mt. Britton), *González-Más 1508* (US). Manatí: *Sintenis 6685*

(US). Maricao: *Sintenis 176* (US). Naguabo: Sierra de Naguabo, Loma Icaco, *Shafer 3414* (US). Orocovis: above Divisoria, *N.L. Britton & E.G. Britton 10137* (US). Río Grande: Luquillo Mountains: El Yunque, *Stimson 1956* (US). San Juan: Martín Peña, *Stevenson & Johnston 1678* (US). Vega Alta: Bo. Sabana, ca. 2 km due NE of jct. Rds. 690 & 691, *Proctor 43215* (US). Villalba: Toro Negro Forest Reserve, *González-Más 2001* (US).

6. Eleocharis geniculata (L.) Roem. & Schult., Syst. Veg. 2: 150. 1817; *Scirpus geniculatus* L., Sp. Pl. 48. 1753; *Eleocharis capitata* R. Br., Prodr. 225. 1810, *nom. illeg.* Lectotype: Jamaica. Collector unknown. *Herb. Clifford*: 21, Scirpus 1 (BM), designated by Furtado, Gard. Bull. Straits Settlements 9: 299. 1937.

Scirpus caribaeus Rottb., Descr. Pl. Rar. 24. 1772; *Eleocharis caribaea* (Rottb.) S.F. Blake, Rhodora 20: 24. 1918. Type: St. Croix, U.S. Virgin Islands. Collector unknown (holotype: C-Rottb.).

Scirpus geniculatus var. *minor* Vahl, Enum. Pl. 2: 251. 1805; *Eleocharis geniculata* var. *minor* (Vahl) Roem. & Schult., Syst. Veg. 2: 150. 1817. Type: Jamaica. Collector unknown (holotype: probably at C-Vahl).

Eleocharis sintenisii Boeck., Beitr. Cyper. 1: 16. 1888. Lectotype: Puerto Rico; Bayamón. *Sintenis 1220* (NY!), here designated.

Scirpus capitatus sensu Grisebach, Fl. Brit. W. I. 570. 1864, non Linnaeus, 1753.

Fig. 50. A-E

Densely tufted annual or short-lived perennial, 2-60 cm tall. Culms obscurely angled, subcompressed, 0.3-1 mm wide, prominently ribbed. Sheaths finely many-veined, smooth, green, reddish to purplish proximally, oblique at summit, with a concave to truncate orifice, prolonged dorsally into a short, acuminate, cuspidate, thickened tip, slightly shorter than the acute to acumiante apex. Spikelets ovoid, ovoid-ellipsoid, of globose-ovoid, rarely ovoid-lanceoloid, 2-4.5 (-6) × 1.3-3.3 mm, obtuse, obtuse or sub-rounded at base, many-flowered, the florets spirally imbricate; fertile scales herbaceous, elliptic, 1.3-2 × 1-1.3 mm, boat-shaped to shallowly so, dorsally broadly rounded, dark green to brown with pale margins, carina obscurely nerved, ending short of the obtuse apex, the basal scales elliptic to widely elliptic; sterile basal scale 1, 1.2-1.5 × 1.0-1.5 mm, 1-nerved, light green to straw-colored, smooth and shiny, with pale green mid rib thickened distally, tipped by an expanded callose. Stamens 3, the anthers 0.5-0.6 mm long, apiculate; styles 2-branched. Achene biconvex, obovate, 0.9-1.1 (including style base) × 0.6-0.8 mm, smooth, lustrous, dark purplish black to black; style base depressed-conic, saucer-shaped, 0.2-0.3 mm long, 0.3-0.5 wide at base, whitish; bristles 6-8, rarely absent, whitish to tawny, retrorsely barbed, equaling or exceeding the style base.

General distribution: In tropical and subtropical regions worldwide.

Distribution in Puerto Rico and the Virgin Islands: Often on wet, sandy or gravelly soils of river banks, river beds, rock crevices and ledges along rivers, pond and lagoon margins, springy seepage areas, savannas, marshy and swampy areas, borders of mangroves, swales, pastures, roadsides ditches, and disturbed areas. Aibonito, Añasco, Arecibo, Arroyo, Bayamón, Cabo Rojo, Caguas, Carolina, Cataño, Cayey, Ceiba, Coamo, Dorado, Guánica, Guayama, Isabela, Lajas, Loíza, Manatí, Maricao, Mayagüez, Morovis, Naguabo, Patillas, Quebradilla, Río Grande, San Juan, San Sebastián, Toa Baja, Trujillo Alto, Vega Alta, Vega Baja, Vieques, and Villalba; Anegada, St. Croix, St. John, St. Thomas, and Tortola.

Note: Small plants with acute spikelets, appearing transitional between this species and *Eleocharis bahamensis* Boeck., occur on Puerto Rico and Anegada, e.g., *Proctor 43067* (SJ!, US!) and *D'Arcy 5144* (MO!) respectively. None of the characters cited by Correll & Correll (1982) as differentiating the two species were consistent in material examined for the flora area.

Selected specimens examined: Puerto Rico: Añasco: *Sintenis 5617* (US). Bayamón: *Sintenis 1219* (US), *1220* (NY). Cabo Rojo: (Joyuda), road 102, *González-Más 570* (US). Cataño: Back of Cataño, *Heller 6412* (US). Cayey: *Sintenis 2344* (US). Coamo: *Sintenis 1968, 3041, 3145* (US); *Underwood & Griggs 528* (US). Dorado: Dorado to Cerro Gordo road, km 13, *González-Más 294* (US). Guánica: *González-Más* 954 (US). Guayama: Puerto Jobos, road 707, *González-Más 655* (US). Loíza: Bo. Loíza Aldéa, just NE of town and E of the Río Grande de Loíza, *Proctor 43067* (US). Mayagüez: Limón Road, *González-Más* 1272 (US). Naguabo: Rd. 31, km 29.6, Río

Blanco, *González-Más 1377* (US). Río Grande: Rd. 187, km 145, *González-Más 1446* (US). San Juan: Santurce, *Heller & Heller 585* (US); Laguna San José, *N.L. Britton & E.G. Britton 7179* (US).Toa Baja: Palo Seco, *Hioram 815* (US). Vega Baja: Tortuguero Lagoon, *González-Más 1054* (US). Vieques Island: Resolución to Punta Arenas, *Shafer 2893* (US). St. John: Reef Bay Quarter; along Fish Bay Gut, *Acevedo-Rdgz. 2497* (US, VINPS). St. Thomas: Jumbee Gut, *Eggers s.n.* (NA).

7. Eleocharis interstincta (Vahl) Roem. & Schult., Syst. Veg. 2: 149. 1817; *Scirpus interstinctus* Vahl, Enum. Pl. 2: 251. 1805. Type: West Indes. *Martfelt s.n.* (holotype: C-Vahl).

Coarse, stoloniferous perennial, (18-) 40-120 (-152) cm tall; rhizome with a short caudex, emitting coarse stolons, 2-4 mm thick; roots coarse, light brown or reddish brown. Culms erect, stout, (2-) 4-9 (-11) mm wide, terete, hollow, easily compressed, prominently and conspicuously transversely septate, the intervals between the septae 5-35 (-60) mm long, becoming approximate distally below the inflorescence. Sheaths often loose, membranous to herbaceous, pale green, faintly to strongly mottled or tinged with red-brown, smooth, glossy, the orifice obliquely truncate with a broadly triangular-acute to abruptly acuminate summit dorsally. Spikelets cylindrical, (15-) 25-50 (-70) × 3.5-6 (-7) mm, obtuse at apex, many-flowered, the florets spirally imbricate; fertile scales broadly oblong-ovate, broadly oblong-obovate, or subrounded, 4-6 × 2.3-5 mm, obtuse to broadly rounded at apex, dorsally obtuse to rounded, chartaceous, finely striate, stramineous or grayish green, obscurely 3- to 8-nerved medially, the margins broadly scarious; sterile basal scales 2-3, semi-circular to subdeltoid, subcoriaceous, with white-hyaline margins. Stamens 3, the anthers 1.8-3 mm long, with a subulate apiculum; style 2- or 3-branched. Achene thickly biconvex, obovate to elliptic-obovate or broadly obovate, (1.3-) 1.6-2 × 1-1.8 mm, subabruptly narrowed to a truncate, pronounced, annular-thickened apex, short-attenuate to obtuse at base, semi-glossy, with prominent transversely oriented linear cells arranged in longitudinal rows, yellowish brown or gray; style base lanceolate, flattened, subdeltate basally, 0.6-1.5 mm long, 0.8-1 mm wide at base, gradually tapering to the style, dark brown; bristles 7-8, stout, flattened, reddish, coarsely retrorsely spinulose nearly to base, exceeding the achene body, shorter than to exceeding tip of style base.

General distribution: Widespread in subtropical and tropical America; southern United States (Florida, Alabama, Oklahoma, and Texas), Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico and the Virgin Islands: In water or wet habitats; borders of lagoons, ponds, marshy and swampy areas, stream edges, pasture, roadside ditches, and disturbed areas. Añasco, Arecibo, Caguas, Cataño, Cidra, Corozal, Dorado, Florida, Guánica, Guayama, Guayanilla, Humacao, Luquillo, Manatí, Mayagüez, Naguabo, Peñuelas, Río Grande, San Juan, San Sebastián, Utuado, Vega Baja, and Yauco; St. Croix, and St. Thomas.

Common names: Puerto Rico: *Junco, Junco de aparejos, Junco de ciénaga, Junco de espiga.*

Selected specimens examined: Puerto Rico: Arecibo: Bosque de Río Abajo, Los Puercos, *Acevedo-Rdgz. 149* (SJ). Cataño: Rd. 165, km 5, *González-Más 1163* (US). Guayama: Puerto Jobos: Rd. 707, *González-Más 694* (US). Guayanilla: Guayanilla to Tallaboa, *Shafer 1977* (US). Manatí: SE side of Laguna Tortuguero, *Strong et al. 420* (GMUF). Mayagüez: Las Mesas, *Holm s.n.* (US). Naguabo: Rd. 3, km 41, *González-Más 1364* (US). Vega Baja: Laguna Tortuguero, *González-Más 1059* (US). St. Croix: Jealousy, *J.J. Ricksecker 252* (US). St. Thomas: Signalhill, *Eggers s.n* (US).

8. Eleocharis minutiflora Boeck., Bot. Jahrb. Syst. 7: 274. 1886; *Eleocharis nigrescens* var. *minutiflora* (Boeck.) Svenson, Rhodora 39: 226. 1937. Type: St. Thomas, U.S. Virgin Islands, Krum Bay. *Eggers 546* (holotype: B, destroyed; isotypes: AMD, CAS, GOET, L).

Eleocharis minima sensu C. B. Clarke in Urban, Symb. Antill. 2: 70. 1900 (in part), non Kunth, 1837.

Eleocharis microcarpa sensu Britton & P. Wilson, Bot. Porto Rico 5: 92. 1923, non Torrey, 1836.

Delicate perennial, 2-12 cm tall, forming small clumps; rhizome short, ascending to nearly vertical, several-branched; roots capillary. Culms ascending to reflexed, filiform, 0.2-0.4 (-0.5) mm

wide, finely ribbed, several-channeled, semi-glossy. Sheaths short, membranous, few to absent, rarely more than one per culm, stramineous to reddish tinged, the orifice oblique, narrowed to an acute to acuminate scarious apex dorsally. Spikelets compressed, ovoid to ovoid-ellipsoid or oblong-ovoid, (1.5-) 1.7-3 × 1-1.5 mm, acute, rounded-cuneate at base, loosely several-flowered with spirally imbricate or subdistichous florets, the scales spreading; fertile scales ovate, boat-shaped, 0.8-1 × 0.6-0.8 mm, thinly herbaceous to membranous, acutely to obtusely keeled dorsally, with 1- to 3-nerved green to pale green carina, stramineous, often faintly tinged with yellow-brown, short-mucronate at the acute to subobtuse entire or short-cleft apex; sterile basal scale 1, ovate, with broad green, 5-veined carina and broadly scarious margins, the apex obtuse. Stamens 3, the anthers 0.3-0.4 mm long, bluntly apiculate; style 3-branched. Achene trigonous with convex sides, narrowly obovate, 0.5-0.6 × 0.3-0.4 mm, obtuse at apex, cuneate at base, distinctly costate on angles, finely and indistinctly cellular-reticulate, essentially smooth, semi-glossy; style base triquetro-pyramidal, 0.1-0.2 long, 0.2-0.3 mm wide at base, shallowly articulate with apex of achene, brown; bristles absent or 1-2 short rudimentary ones present.

General distribution: Mexico (Yucatan), Cuba, and St. Thomas.

Distribution in the Virgin Islands: St. Thomas.

Note: Eleocharis minutiflora consistently differs from its closest relative *E. nigrescens* in the lighter colored spikelet scales; distinctly costulate achenes with a smoother surface (finely and indistinctly reticulate); and more pyramidal style base (vs. depressed-pyramidal in *E. nigrescens*).

Selected specimens examined: St. Thomas: Crum Bay, *Eggers 767* (US).

9. Eleocharis montana (Kunth) Roem. & Schult., Syst. Veg. 2: 153. 1817; *Scirpus montanus* Kunth in Humb., Bonpl., & Kunth, Nov. Gen. Sp. [quarto ed.] 1: 226. 1816. Type: Colombia. *Humboldt & Bonpland s.n.* (holotype: P-HBK).

Scirpus nodulosus Roth, Nov. Pl. Sp. 29. 1821; *Eleocharis nodulosa* (Roth) Schult., Mant. 2: 87. 1824. Type: Brazil. Collector unknown (holotype: B, destroyed).

Rhizomatous perennial, (20-) 30-80 (-120) cm tall; rhizome decumbent, stout, 4-8 mm thick. Culms erect, cylindrical, striate, conspicuously transversely septate or sometimes inconspicuously so, 1-2.5 mm wide, intervals between septa 1-5 mm long. Sheaths elongate, thinly herbaceous, finely striate, purplish red proximally, stramineous or purple-tinged distally, red-dotted, the orifice truncate with blackish maculate horizontal band and a tooth-like mucro dorsally. Spikelets ovoid-lanceoloid to oblong-lanceoloid, 7-15 (-24) × 2-4 mm, acuminate or rarely obtuse at apex, many-flowered, the florets spirally imbricate; fertile scales ovate-lanceolate, (1.5-) 2-2.5 × 0.8-1.7 mm, dorsally rounded, membranous to thinly herbaceous medially, light brown, often dark brown medially, reddish lineolate, margins broadly scarious, carina slender, 1-nerved, indistinct, ending short of the obtuse or rounded, slightly dialated apex; sterile basal scale 1, subrounded, herbaceous, the margins broadly scarious. Stamens 3, the anthers 0.8-1 mm long; style 2- or 3-branched. Achene biconvex, obovate to broadly obovate, 0.9-1.1 × 0.6-1 mm, cuneate at base, rounded to subtruncate at apex, distinctly and finely pitted-reticulate, yellow to brown or olivaceous; style base flattened, deltate to depressed-deltate, 0.3-0.4 mm long, 0.4-0.7 mm wide at base, shallowly articulated with apex of achene body; bristles 4-6, unequal, forming a short stipe where commonly joined at base, minutely retrorsely spinulose or somewhat smooth, equaling or slightly longer than achene body, ferrugineous or brownish.

General distribution: Southern United States, Mexico, Central America, West Indies, and tropical South America.

Distribution in Puerto Rico and the Virgin Islands: In wet habitat; marshy or swampy areas, along forest trails, and roadside ditches. Aibonito, Naguabo, and Río Grande; cited for St. Croix by Fosberg, Rhodora 78: 86. 1976.

Selected specimens examined: Puerto Rico: Aibonito: *N.L. Britton et al. 8252* (US). Naguabo: Rd. 191, km 21.1, *González-Más 1397* (US).

10. Eleocharis mutata (L.) Roem. & Schult., Syst. Veg. 2: 155. 1817; *Scirpus mutatus* L., Syst. Veg. ed. 10. 867. 1759. Lectotype: Jamaica. *Browne s.n.* (LINN-71.2), designated by Browning et al., S. Afr. J. Bot. 63: 172. 1997.

Coarse, stoloniferous perennial, (15-) 25-100 (-120) cm tall; rhizome short, emitting coarse, dark brown stolons, 2-4 mm thick. Culms caespitose, erect, acutely trigonous to triquetrous, rarely obtusely trigonous, finely striate, (1.3-) 2-5 (-7) mm wide. Sheaths elongate, membranous, semi-glossy, stramineous or light brown, tinged with red, often darkly so proximally, obliquely truncate at orifice, prolonged dorsally, the slender midvein excurrent and forming a cuadate appendage beyond the acute to acuminate apex. Spikelets cylindrical, (15-) 20-50 × 4-6 mm, obtuse, little wider than the culm, many-flowered, the florets spirally imbricate; fertile scales rounded-obovate to rounded, 2.7-5 × 2-4.5 mm, subcartilaginous medially, dorsally obtuse, often subcarinate, indistinctly finely and closely veined, stramineous medially, brown-lineolate, the margins broadly scarious, subtranslucent, carina 1-nerved, indistinct abaxially, distinct adaxially, ending short of the obtuse apex; sterile basal scales 0-1, like the fertile, the basal bract nearly encircling base of spikelet. Stamens 3, the anthers 1.3-2.3 mm long, with a lanceolate, reddish papillate apiculum; style 3-branched. Achene biconvex, broadly obovate, 1.5-2 × (1-) 1.2-1.5 mm, cuneate at base, rounded to an annular-thickened apex which merges gradually into the short style base, shallowly reticulate with 21-24 longitudinal rows of transversely oriented oblong cells, shiny, yellow to orange-brown; style base short, compressed-deltate, 0.2-0.6 mm long, 0.6-0.8 mm wide at base, annular-thickened at base; bristles 7-8, unequal, retrorsely spinulose with coarse, soft spinules, equaling to slightly overtopping achene, lustrous brown.

General distribution: Southern United States (Texas), Mexico, Central America, West Indies, South America, and tropical Africa.

Distribution in Puerto Rico and the Virgin Islands: In water or wet habitats, generally in coastal areas; marshes, swamps, swales, shallow pools, borders of lakes and ponds, estuaries, channels, borders of mangroves, pastures, and roadside ditches. Arecibo, Arroyo, Cabo Rojo, Cataño, Culebra, Dorado, Fajardo, Guánica, Guayama, Humacao, Isabela, Loíza, Luquillo, Manatí, Naguabo, Río Grande, Salinas, San Juan, Vega Baja, Vieques, and Yabucoa; Anegada, St. Croix, and Tortola.

Selected specimens examined: Puerto Rico: Arroyo: Estuary - Guilarte Beach, *González-Más 1323* (US). Cataño: Rd. 165, km 5, *González-Más 1164* (US). Culebra Island: *N.L. Britton & Wheeler 172* (US). Guánica: Guánica Lake, *Sargent 39* (US). Humacao: Pozal, playa de Humacao, *Eggers s.n.* (US). Río Grande: Bo. Zarzal, vicinity of Punta Picúa, *Proctor 43544* (US). Salinas: Rd. 705, km 1, *González-Más 719* (US). San Juan: Martín Peña, *Stevenson 263* (US). Vega Baja: Tortuguero Lagoon, *González-Más 1056* (US). Vieques Island: Playa Grande to La Mina, *Shafer 2999* (US). Yabucoa: *Sintenis 4942* (US). St. Croix: Bethlehem Gut, *J.J. Ricksecker 414* (US); St. John's, *A.E. Ricksecker 210* (US).

11. Eleocharis oligantha C. B. Clarke in Urban, Symb. Antill. 2: 69. 1900. Type: Cuba. *Wright 3367* (syntype: K; isosyntype: G); *3368* (syntype: K; isosyntype: G, NY).

Scirpus retroflexus sensu Grisebach, Cat. Pl. Cub. 239. 1866, non Poiret, 1805.

Delicate, densely matted, often proliferous annual, 1-15 cm tall, often forming spikelets at culm bases. Culms often recurved, hair-like, finely capillary, quadrangular-sulcate, minutely punctate, 0.1-0.3 mm wide. Sheaths membranous, reddish proximally, stramineous distally, the orifice hyaline, subinflated, oblique, with a dorsal green carina which ends short of the obtuse apex; spikelets sublaterally compressed, ovate, 1.8-5.5 × 1-2 mm, acute to acuminate, obtuse at base, with 3-15 florets, the florets spirally imbricate or subdistichous; fertile scales spreading with developing achenes, ovate to ovate-lanceolate, 1.2-2.2 × 0.6-1 mm, submembranous, light brown, dark purplish brown medially, finely and closely nerved, broadly hyaline on margins, carina 1-nerved or closely 3-nerved, green, equaling or shortly prolonged beyond the acute to obtuse apex as a mucro; sterile basal scales 1, hyaline except for the carina, oblong-ovate, slightly shorter than the fertile, broadly rounded at apex. Stamens 2-3, the anthers 0.4-0.7 mm long, apiculate; style 3-branched. Achene trigonous, indistinctly costate on angles with slightly convex sides, obovoid, 0.7-1 (including style base) × 0.4-0.6 mm, sub-rounded at apex, short-cuneate at base, faintly reticulate, shiny, pale, becoming gray to dark olive-brown at maturity; style base pyramidal to depressed-pyramidal, acute, 0.1-0.2 mm long, 0.3-0.5 mm wide at base, somewhat 3-pronged at base, light

brown; bristles 3-6 or rudimentary, finely retrorsely spinulose, shorter than to as long as the achene body.

General distribution: Central and western Cuba, Jamaica, and Puerto Rico.

Distribution in Puerto Rico: Known only from a single locality; muddy border of a small pond in silica-sand area of north-central Puerto Rico; Vega Alta. However, according to G. Proctor (pers. comm., 2003), it grows in a pond in Vega Baja as an aquatic extreme previously thought by him to be *Eleocharis confervoides* (see excluded species at the end of *Eleocharis* descriptions).

Selected specimens examined: PUERTO RICO: Vega Alta: Bo. Sabana, silica-sand area NE of Regardera, 1.7-2.2 km due NE of jct. Rds. 690 and 691, *Proctor 44145, 44572, 45796* (US).

12. Eleocharis pachystyla (C. Wright) C. B. Clarke in Urban, Symb. Antill. 2: 72. 1900; *Scirpus pachystylus* C. Wright in Sauvalle, Anales Acad. Ci. Méd. Habana 8: 79. 1871, as a new name for *Scirpus melanocarpus* Griseb., Cat. Pl. Cub. 239. 1866, non Torrey, 1836. Type: Cuba; Pinar del Río. *Wright 3373* (holotype: GOET; isotype: GH).

Caespitose perennial, 17-60 (-95) cm tall; rhizome short, horizontal or branched-ascending; roots medium. Culms ascending to sub-erect , 0.7-2 (-3) mm wide, terete to flattened-sulcate when dry, rather soft, shallowly ribbed, finely cellular-reticulate, light green, glossy. Sheaths tight, purple-red, often light green to stramineous distally or only at orifice, thinly herbaceous, thickened-membranous at the oblique orifice, acute at apex dorsally. Spikelets obovoid, 5-7 (-8) × 2-3.5 mm, obtuse at apex, often clavate at base, the florets spirally imbricate; fertile scales numerous, ovate to oblong-ovate or oblong-elliptic, 2-3 × 1-1.7 mm, thinly herbaceous, dorsally obtuse, stramineous, brown-lineolate proximally, margins scarious, carina indistinct, green or green-dotted distally, not prolonged beyond the obtuse to subtruncate apex; sterile basal scales 3-10 or more, the uppermost like the fertile, the lowermost 1-2 broadly ovate or subrounded, thickly herbaceous, with broad green to dark green carina. Stamens 3, the anthers 0.6-0.8 mm long; style 3-branched. Achene trigonous, narrowly obovoid or obconical, 0.8-1.1 × 0.6-0.8 mm, rounded at apex, short-acuminate at base, finely costate on margins, essentially smooth, shiny, light brown to yellowish brown; style base flattened-pyramidal, sulcate on sides, sometimes subfalcate and decurrent on shoulders of achene, 0.5-0.8 mm long, 0.5-0.6 mm wide at base, light brown to brown; bristles 6, filiform, retrorsely spinulose, brown or reddish, slightly shorter than to equaling or slightly exceeding achene body.

General distribution: Southern Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico: Low elevation, wet, often peaty, marshy habitats of silica-sand areas in the vicinity of Laguna Tortuguero; Dorado and Vega Alta.

Selected specimens examined: PUERTO RICO: Vega Alta: Bo. Sabana, silica-sand area NE of Regardera (1.7-2.2 km due NE of jct. Rds. 690 and 691, *Proctor 42892, 43282* (US). Dorado: Vicinity of Dorado, *N.L. Britton et al. 6674* (US).

13. Eleocharis radicans (A. Dietr.) Kunth, Enum. Pl. 2: 142. 1837; *Scirpus radicans* Poir. in Lamarck, Encycl. 6: 751. 1805, non Schkuhr, 1793; *Eleogiton radicans* A. Dietr., Sp. Pl. 2: 97. 1833; *Eleocharis acicularis* var. *radicans* (A. Dietr.) Britton, J. New York Microscop. Soc. 5: 105. 1889. Type: Puerto Rico. *Ledrú s.n.* (holotype: probably at P).

Eleocharis acicularis var. *lindheimeri* C. B. Clarke ex Britton, J. New York Microscop. Soc. 5: 105. 1889; *Eleocharis lindheimeri* (C. B. Clarke ex Britton) Svenson, Rhodora 31: 199. 1929. Type: United States; Texas. *F. Lindheimer 1315* (holotype: K, isotype: GH).

Slender and delicate, caespitose perennial, 2-9 (-13) cm tall, often forming dense mats; rhizomes capillary, horizontal to ascending. Culms borne singly or in tufts along rhizome, ascending, compressed-trigonous, soft and spongy, finely ribbed, dark green, 0.3-0.6 (-1) mm wide. Sheaths membranous, tightly surrounding culm, oblique at orifice, dorsally with a narrow, thickened tip at the subacute apex. Spikelets ovoid to lanceoloid or ovoid-ellipsoid, 2-4 × 0.8-1.7 mm, with 6-15 florets, the florets spirally imbricate; all scales fertile, ovate to narrowly ovate-elliptic or ovate-lanceolate, 1.4-2.3 × 0.6-1.1 mm, membranous, stramineous with broad scarious margins, carina green, 5- to 7-nerved, converging and ending in a

thickened tip short of the scarious, obtuse apex. Stamens 2 or 3, the anthers 0.3-0.5 mm long, apiculate; style 3-branched. Achene subterete, narrowly ellipsoid-obovoid, 0.7-1.1 × 0.3-0.5 mm, narrowly rounded at apex, cuneate at base, longitudinally ribbed with 3 coarser ribs on angles and cross-lined with fine close trabeculae; yellowish; style base narrow, 0.2-0.4 mm long, 0.2 mm wide at base, conic-triangular, articulate at base with apex of achene; bristles 4-7, capillary, whitish, barbed, usually exceeding the achene and style base.

General distribution: United States, West Indies, Mexico, Central America, and temperate South America.

Distribution in Puerto Rico: Recorded at present only in the Botanic Garden University of Puerto Rico, San Juan. It is cited on the specimen label as being cultivated there, but it is very likely adventive. Previously known only from the type.

Selected specimens examined: PUERTO RICO: San Juan: *Liogier & Liogier 29030* (UPR; photo at US).

14. Eleocharis retroflexa (Poir.) Urb., Symb. Antill. 2: 165. 1900; *Scirpus retroflexus* Poir. in Lamarck, Encycl. 6: 753. 1805. Type: Puerto Rico. *Ledrú s.n.* (holotype: P; isotype: P).

Cyperus depauperatus Vahl, Enum. Pl. 2: 305. 1805. *Eleocharis depauperata* (Vahl) Kunth, Enum. Pl. 2: 140. 1837. Type: West Indies. *Rohr s.n.* (holotype: probably at C-Vahl).

Eleocharis chaetaria sensu C. B. Clarke in Urban, Symb. Antill. 2: 68. 1900, non Roemer & Schultes, 1817.

Caespitose annual, 1-20 cm tall, often forming spikelets at culm bases. Culms usually recurved, filiform, star-shaped or subflattened, sometimes bluntly scabrous on margins, obscurely punctate 0.2-0.4 mm wide. Sheaths subloose and inflated, cross-puckered, membranous, stramineous to reddish tinged, scarious at obliquely truncate orifice, prolonged dorsally as a lanceolate appendage, the slender carina excurrent beyond the acuminate apex. Spikelets ovate or elliptic, 2.5-4 (-4.3) × 1.2-1.8 mm, sublaterally compressed, obtuse to acute, cuneate at base, 2- to 8-flowered, the florets subdistichously disposed, often spreading with maturing achenes; fertile scales ovate to ovate-lanceolate, 1.7-2.5 × 1-1.7 mm, membranous, obtuse to acute at apex, boat-shaped, dorsally acute, often with chestnut to reddish or purplish brown medially on sides, margins broadly scarious, carina pale green, 3-nerved; sterile basal scales 1, ovate-elliptic, like the fertile. Stamens 3, the anthers 0.4-0.6 mm long, apiculate; style 3-branched. Achene trigonous, obovoid to urceolate, 0.6-1.1 × 0.4-0.6 mm, subattenuate to base, with prominent costate angles and convex sides, pitted-reticulate with 7-10 longitudinal rows of isodiametric cells on each side, whitish or stramineous, maturing olive-yellow; style base pyramidal-acuminate, the angles decurrent on shoulders of achene, with slightly upturned tips, 0.3-0.4 mm long, 0.3-0.5 mm wide at base, light brown; bristles 6, subulate, retrorsely spinulose distally, whitish to pale, shorter than to 1 or 2 sometimes equaling or slightly exceeding style base.

General distribution: Southern United States (Alabama), tropics and subtropics of Mexico, Central America, West Indies, South America, Asia, Malesia, and Australia.

Distribution in Puerto Rico and the Virgin Islands: In wet mud or sand of forested areas, generally at middle to higher elevations, on eroded slopes, river and creek banks, stream beds, trails, pastures, roadside banks, and ditches. Adjuntas, Arecibo, Bayamón, Caguas, Carolina, Cayey, Fajardo, Guayama, Mayagüez, Naguabo, Patillas, Río Grande, San Juan, and San Sebastián; cited by C. B. Clarke (1900) and Britton (1918) for St. Thomas.

Selected specimens examined: PUERTO RICO: Adjuntas: Monte Cerrote, near Adjuntas, *N.L. Britton & Brown 5406* (US). Arecibo: Río Abajo State Forest, along limon trail, *Acevedo-Rdgz. 10667* (US). Bayamón: *Sintenis 1209* (US). Carolina: Sabana Abajo, *N.L. Britton & E.G. Britton 9199* (US). Cayey: Rd. 184, Guavate, km 5.7, *González-Más 1577* (US). Fajardo: Colonia San Miguel, *N.L. Britton & Shafer 1630* (US). Mayagüez: Near Hacienda Alicia, *Liogier 9926* (US). Naguabo: Sierra de Naguabo, Bo. de Maizales, *N.L. Britton et al. 2108* (US). Río Grande: Sierra de Luquillo, *Sintenis 1403* (US). San Juan: Río Piedras, *Hioram 919* (US). San Sebastián: *Sargent 242* (US).

15. Eleocharis rostellata (Torr.) Torr., Fl. New York 2: 347. 1843; *Scirpus rostellatus* Torr.,

Ann. Lyceum Nat. Hist. New York 3: 318. 1836. Type: United States; New York. *Sartwell s.n.* (lectotype: US!; isolectotypes: GH, NY), here designated.

Coarse rhizomatous perennial forming tussocks, 10-60 (-80) cm tall; rhizome short and thickened, erect; roots coarse. Culms erect to ascending, some often arching or reclining and rooting at tip, (0.5-) 0.7-1.8 (-2.2) mm wide, flattened, sulcate. Sheaths coriaceous, subloose, drab to chocolate brown proximally, light brown to stramineous or light green distally, dorsally obtuse to subacute, midcosta abruptly dialated and thickened near apex, the orifice suboblique to nearly truncate, maculate, with a subthickened, reddish brown or blackish margin. Spikelets ovoid to ovoid-lanceoloid or fusiform, 6-20 × 2-3.5 mm, acute at apex, many-flowered, the florets and subtending scales often arranged in a subloose spiral on the rachis, this causing the spikelet to appear as if twisted on its axis; fertile scales ovate to ovate-lanceolate, 3-5 × 1.8-3 mm, thickly herbaceous, stiffish, drab or brown, margins thickly scarious, obtuse at apex; sterile basal scales 2 or sometimes all scales of spikelet fertile, similar to the fertile, widely ovate or subrounded, often with widely scarious margins and rounded apex. Stamens 3, the anthers 2-2.7 mm long, bluntly apiculate; style 3-branched (on all specimens studied). Achene obtusely trigonous, obovoid to ellipsoid-obovoid, 1.4-2 × 1-1.5 mm, narrowed at summit into the confluent pyramidal style base, obtuse at apex, acute to subcuneate at base, yellowish brown to olive brown, smoothish, finely and indistinctly cellular-reticulate, lustrous; style base obtusely pyramidal to lance-pyramidal, seemingly a continuation of the achene apex but of a slightly different texture; bristles 6, subulate, closely retrorsely spinulose, sometimes appearing subplumose, reddish, equaling to exceeding tip of style base.

General distribution: Southern Canada, United States, Mexico, West Indies, and Andean South America.

Distribution in Puerto Rico: Wet, marshy or boggy habitats in white silica sand areas of north-central Puerto Rico. Arecibo, Manatí, and Vega Baja.

Selected specimens examined: Puerto Rico: Arecibo: Bo. Islote, border of Ciénaga, *Proctor & Rivera 46411* (US). Vega Baja: Bo. Algorrobo, white sand area just S of Laguna Tortuguero, *Proctor et al. 47747* (US). Manatí: Tortuguero, *Woodbury s.n.* (US); Bo. Tierras Nuevas Saliente, *Woodbury s.n.* (US).

Excluded species

Eleocharis atropurpurea (Retz.) J. Presl & C. Presl in C. Presl, Reliq. Haenk. 1: 196. 1828. Reported for Anegada by D'Arcy in "Anegada Island: Vegetation and Flora", Atoll. Res. Bull. No. 188: 15. 1975, based on *D'Arcy 5144* (MO!), but later identified by F.J. Menapace as *E. bahamensis* Boeck. C. B. Clarke (1900) also reported this species for Puerto Rico based on *Sintenis 1220*. Both *D'Arcy 5144* and *Sintenis 1220* are *Eleocharis geniculata* (L.) Roem. & Schult. No specimens of *Eleocharis atropurpurea* or *E. bahamensis* from Puerto Rico or the Virgin Islands have been seen in the preparation of this treatment.

Eleocharis confervoides (Poir.) G. C. Tucker: Cited as *Websteria confervoides* (Poir.) S.S. Hooper by Liogier & Martorell (2000: 247) as collected by G. Proctor at Vega Baja. No specimens of this taxon have been seen nor has it been recently collected in Puerto Rico. According to G. Proctor (pers. comm. 2003) the Vega Baja plant represents an aquatic extreme of *Eleocharis oligantha* C. B. Clarke.

Eleocharis pachycarpa E. Desv. in C. Gay, Fl. Chil. 6: 174. 1853. Reported for Puerto Rico by Kartesz (1998) in "A Synonymized Checklist of the Vascular Flora of the United States, Puerto Rico, and the Virgin Islands" (http://www.csdl.tamu.edu/FLORA/b98/check98.htm). However, no specimen record exists (Kartesz, pers comm., 2001) to confirm this record.

7. FIMBRISTYLIS

Fimbristylis Vahl, Enum. Pl. 2: 285. 1805, *nom. conserv.*

Perennials or annuals, rhizomatous or tufted with fibrous roots. Culms cylindrical, or subcompressed to flattened, finely to coarsely ribbed, smooth, glabrous. Leaves basal; sheaths glabrous or pubescent, closed at summit, ventrally splitting with age, the apex entire; ligule absent or present; blades flattened or inrolled, sometimes folded, narrowly linear to filiform, glabrous or pubescent, the margins smooth or scabrous. Inflorescence an open, simple or compound anthela with ascending rays, or sometimes a head-like cluster with congested spikelets; involucral bracts leaf-like, usually smaller than the leaves, rarely overtopping the inflorescence; primary and secondary rays (when present) unequal, slender, finely ribbed, cylindrical to subflattened, smooth or scabrous; spikelets ovoid, oblong-ovoid, subglobose, or lanceoloid, borne singly at ray tips or sometimes clustered, many-flowered; scales all fertile except for the lowermost one, spirally imbricate, occasionally somewhat distichous, ovate to oblong-ovate, obtuse to acute, glabrous or pubescent, 1- to 5-nerved on sides, dorsally with an often 3-nerved carina, the nerves converging at apex and forming a mucro. Flowers bisexual; hypogynous squamellae or bristles absent; stamens 1-3, the anthers oblong or linear, sometimes apiculate; styles 2- or 3-branched, the unbranched portion flattened and fimbriate on margins (2-branched style) or slender, 3-angled basally, and glabrous (3-branched style), disarticulating from the summit of the achene. Achene biconvex, lenticular, or trigonous, obovate, elliptic-obovate, or oblong, smooth, cancellate, reticulate, verrucose, or warty. A genus of approximately 300 species in warm temperate and tropical climates worldwide, with the center of diversity in southeastern Asia.

TYPE: *Fimbristylis dichotoma* (L.) Vahl [as "*dichotomum*"] (≡ *Scirpus dichotomus* L.), *typ. conserv.*

Reference: Kral, R. 1971. A treatment of *Abildgaardia, Bulbostylis,* and *Fimbristylis* (Cyperaceae) for North America. Sida 4: 57-227.

Key to the species of *Fimbristylis*

1. Style 3-branched, or 2-branched in *F. cymosa*, the unbranched portion slender, entire, often 3-angled at expanded base..... 2
   2. Leaves with a ligule of short dense hairs at adaxial junction of sheath and blade; spikelets 4-7 (-9) mm long ..... 1. *F. complanata*
   2. Leaves eligulate at adaxial junction of sheath and blade; spikelets 1.5-4 (-5) mm long..... 3
      3. Style 2-branched (in the flora area); achene obovate or pyriform, dorsiventrally compressed, faintly reticulate, low-papillate, opaque, maturing blackish ..... 2. *F. cymosa*
      3. Style 3-branched; achene obovoid, trigonous with convex sides or subrounded, cancellate, verrucose or tuberculate, translucent, maturing pale brown to gray brown..... 4
         4. Leaf sheaths laterally compressed, dorsally keeled, slightly spongy-thickened; blades folded and essentially unfacial; spikelets globose or ovoid-globose, rounded at apex; mucro shorter than to equaling the obtuse, rounded or emarginate apex of scale..... 6. *F. littoralis*
         4. Leaf sheaths dorsally compressed and rounded; blades not spongy-thickened, flattened; spikelets ovoid, acute at apex; mucro prolonged and slightly excurved beyond the acute to acuminate apex of scale ..... 7. *F. quinquangularis*
1. Style 2-branched, the unbranched portion flattened, fimbriate on margins..... 5
   5. Spikelet scales with dense, silvery, short-appressed hairs distally ..... 4. *F. ferruginea*
   5. Spikelet scales glabrous..... 6
      6. Spikelets 1.7-2.5 mm wide; spikelet scales 2.1-3 × 1.8-2.2 mm; achenes coarsely and deeply striate-reticulate with (5-) 7-9 (-12) longitudinal rows of horizontally oriented, rectangular cells ..... 3. *F. dichotoma*
      6. Spikelets 2.5-3.5 (-4) mm wide; spikelet scales 2.7-4.2 (-5.5) × 2.4-3.8 mm; achenes finely and shallowly reticulate or pitted with 15-37 longitudinal rows of isodiametric or nearly isodiametric cells..... 7

7. Basal sheaths pale brown to brown; spikelet scales with longitudinally striate-nerved surface, semi-glossy, yellowish brown, finely reddish lineolate; achenes finely reticulate with 22-37 longitudinal rows of nearly isodiametric cells..... ..... 5. *F. inaguensis*

7. Basal sheaths dark brown or purple-black; spikelet scales with smooth surface, glossy, dark brown to dark brown or red-brown, the nerves indistinct and often faint; achenes with 15-20 longitudinal rows of shallow to pitlike isodiametric cells ..... 8. *F. spadicea*

1. Fimbristylis complanata (Retz.) Link, Hort. Berol. 1: 292. 1827; *Scirpus complanatus* Retz., Observ. Bot. 5: 14. 1789; *Cyperus complanatus* (Retz.) Willd., Sp. Pl. 1: 270. 1797; *Trichelostylis complanata* (Retz.) Nees in Wight, Contr. Bot. India 103. 1834; *Fimbristylis autumnalis* var. *complanata* (Retz.) Kük., Bot. Jahrb. Syst. 59: 50. 1924. Type: India. *Koenig s.n.* (holotype: C).

Caespitose or rhizomatous perennial, 20-60 (-100) cm tall; rhizome short, ascending. Culms erect, compressed-trigonous proximally, flattened distally, firm, flexuous, sometimes twisted, antrorsely scabrid on margins (at least distally), 0.7-2 mm wide. Leaves numerous, subdistichous, ascending to spreading; sheaths short, the uppermost dorsally keeled, brown to stramineous; ligule a horizontal band of dense hairs, 0.3-0.5 mm wide; blades linear, flattened, 5-70 cm × (1-) 1.3-4 mm, adaxially antrorsely scabrous at base, smooth otherwise, finely veined abaxially, margins finely and closely scabrous, abruptly narrowed to a flattened, slightly curved, acute tip. Inflorescence a terminal, compound, open or contracted anthela with ascending rays, 1.5-9 cm diam.; involucral bracts 4-6, the lowermost one leaf-like, often exceeding the inflorescence, the uppermost linear-setaceous; primary rays 4-12, unequal; spikelets 15-100 or more, ovoid-lanceoloid to lanceoloid, 4-7 (-9) × 1-1.5 (-2) mm, acute, obtuse at base, solitary at ray tips; scales ovate to ovate-lanceolate, 1.4-2.5 × 1-1.5 mm, dorsally acute, brown, reddish lineolate, carina 3-nerved, green, prolonged beyond the acute apex as a short, slightly excurved mucro. Stamens 2 or 3, the anthers 0.7-1 mm long, apiculate; style 3-branched, the unbranched portion smooth, trigonous-dilated at base. Achene trigonous with shallowly convex faces, obovoid, 0.7-1 × 0.5-0.7 mm, apiculate, obtuse at base, tricostate, finely striolate-reticulate, tuberculate to nearly smooth, chalk-white when immature, gray-white or pale brown at maturity.

General distribution: Widespread in subtropical and tropical climates worldwide, often weedy.

Distribution in Puerto Rico and the Virgin Islands: Moist or wet open areas of pond and stream borders, forest margins, grassy areas, sandy savannas, marshes, lake shores, roadsides, and disturbed habitats. Añasco, Bayamón, Cabo Rojo, Caguas, Cayey, Cidra, Dorado, Fajardo, Mayagüez, Moca, Naguabo, Río Grande, San Juan, San Sebastián, Vega Baja, and Yauco; St. Croix.

Selected specimens examined: Puerto Rico: Bayamón: Finca Santa Ana, *Hioram 822* (US). Cayey: Guavate, *Liogier 9772* (US). Naguabo: Sierra de Naguabo, mouth of Río Icaco, *Shafer 3181* (US). Río Grande: Sierra de Luquillo, *Sintenis 1411* (US). San Juan: Río Piedras, *Underwood & Griggs 254* (US). Yabucoa: Sierra de Yabucoa, *Sintenis 2595* (US). Yauco: Río Loco, *Sargent 665* (US). St. Croix: reduced form growing in a flower pot, *Proctor 44990*, SJ.

2. Fimbristylis cymosa R. Br. , Prodr. 1: 228. 1810. Type: Australia. Collector unknown (holotype: BM), fide, Koyama in A.C. Smith, Fl. Vitiensis Nova 1: 243. 1979.

Scirpus glomeratus Retz., Observ. Bot. 4: 11. 1786, non Linnaeus, 1753; *Fimbristylis glomerata* Urb., Symb. Antill. 2: 166. 1900, non Nees von Esenbeck, 1834. Type: Sri Lanka. *Koenig s.n.* (holotype: C).

Fimbristylis spathacea Roth, Nov. Pl. Sp. 24. 1821; *Fimbristylis cymosa* subsp. *spathacea* (Roth) T. Koyama, Micronesica 1: 83. 1964. Type: India. *Heyne s.n.* (holotype: B, destroyed).

Fimbristylis sintenisii Boeck., Bot. Jahrb. Syst. 7: 276. 1886. Type: Puerto Rico. *Sintenis 96b* (holotype: B, destroyed).

Scirpus obtusifolius sensu Grisebach, Fl. Brit. W. I. 571. 1864, non Lamarck, 1791.

Fimbristylis obtusifolia sensu C. B. Clarke in Urban, Symb. Antill. 2: 82. 1900, non (Lamarck) Kunth, 1837.

Rhizomatous perennial, 3-65 (-85) cm tall; rhizome short, thick. Culms erect, rigid, compressed-trigonous, coarsely ribbed and channeled, green to stramineous, 0.5-2 (-3) mm wide, the stout, sheathing bases hard and stiff, with fibrous remnants of old leaf bases. Leaves numerous; sheaths short, rigid, prominently nerved, glabrous, pale green to dark brown, the membranous inner band with a concave orifice; ligule absent; blades stiff, flattened to broadly U-shaped or somewhat involute, spreading, frequently falcate, 3-30 (-50) cm × 0.8-3 mm, to 4 mm wide basally, obscurely veined, green to straw-colored, glabrous, antrorsely scabrous on margins, the apex with an acute, slightly curved tip. Inflorescence a contracted to congested, sometimes open, simple or compound anthela, 1-5 (-8) cm diam.; involucral bracts 2-3, leaf-like but reduced, linear to subulate, shorter than the inflorescence or the lowest one sometimes exceeding the inflorescence; rays compressed, to 4 cm long, or wanting; spikelets 10-150 or more, ovoid, 2.4-4 × 1.8-2.5 mm, acute, sub-rounded at base, solitary at ray tips; scales ovate, slightly keeled, 1.2-1.6 × 0.8-1.2 mm, green to brown, with broad, scarious margins, carina 3-nerved, narrow, light green, emucronate at the obtuse to emarginate apex, lateral nerves wanting or indistinct. Stamens 2, the anthers 0.5-0.7 mm long, apiculate; styles 2-branched (in the flora area) or 3-branched to below the middle, the unbranched portion glabrous, entire, 3-angled at expanded base. Achene unequally biconvex, turgid on both faces, obovoid, 0.7-0.9 × 0.5-0.7 mm, broadly rounded to truncate at apex, bluntly apiculate, cuneate at base, faintly reticulate, low-papillate, opaque, light brown, becoming dark brown to essentially black at maturity.

General distribution: Pantropical.

Distribution in Puerto Rico and the Virgin Islands: Typically wet or dry coastal habitats, on beaches and in sandy savannas, marshy or swampy areas, swales, borders of mangroves, scrub forest, thickets, roadsides, and disturbed areas. Occurring sparingly inland on serpentine or limestone substrate. Arecibo, Arroyo, Bayamón, Cabo Rojo, Camuy, Carolina, Cataño, Cayey, Cayo Icacos, Cayo Lobos, Cayo Ramos, Dorado, Fajardo, Guánica, Guayama, Guayanilla, Hatillo, Humacao, Isabela, Isleta Marina, Juana Díaz, Juyuya, Lajas, Loíza, Manatí, Maricao, Mayagüez, Moca, Mona Island, Naguabo, Ponce, Rincón, Río Grande, Salinas, San Juan, Vega Alta, Vega Baja, Vieques, and Yabucoa; Anegada, St. Croix, St. John, St. Thomas, and Tortola.

Selected specimens examined: Puerto Rico: Arroyo: Playa Guilarte, *González-Más 1311* (US). Bayamón: Bo. Guaraguao Abajo, Road 174, km 6.9, *Proctor & Foy 42329* (US). Cabo Rojo: Boquerón, *González-Más 931* (US). Carolina: Boca de Cangrejos, *González-Más 1016* (US). Cataño: Bo. Palmas, *Axelrod & Díaz 12610A* (UPRRP). Guánica: *Sargent 64* (US). Guayama: Rd. 707, *González-Más 671* (US). Guayanilla: Rd. 336; Bahia, *González-Más 819* (US). Juana Díaz: Pastillo, *González-Más 752* (US). Manatí: Bo. Nuevas Tierras Saliente, *Axelrod & Thomas 11324* (UPRRP). Mayagüez: *N.L. Britton 2363* (US). Mona Island: Camino del Diablo, *Acevedo-Rdgz. et al. 4277* (FTG, MO, NY, SJ, US). Ponce: Bo. Cañas, along dirt road to Punta Cucharas, *Axelrod & Chávez 7329* (US). San Juan: Las Marias, near Santurce, *Hioram 810* (US). Vega Baja: Tortuguero, Rd. 687, *González-Más 1035* (US). Vieques Island: Puerto Ferro Peninsula, *Fosberg 57498* (US). St. Croix: Caledonia Gut, *Fosberg 56790* (US). St. John: Coral Bay Quarter; trail to Fortsberg, *Acevedo-Rdgz. 4087* (JBSD, MO, NY, UPR, US, VINPS).

3. Fimbristylis dichotoma (L.) Vahl, Enum. Pl. 2: 287. 1805; *Scirpus dichotomus* L., Sp. Pl. 50. 1753. Lectotype: Sri Lanka. *Herbarium Hermann 40, v. 2, 63, No. 40* (BM), designated by T. Koyama in A.C. Smith (ed.), Fl. Vit. Nova 1: 244. 1979.

Scirpus annuus All., Fl. Pedem. 2: 277. 1785; *Fimbristylis annua* (All.) Roem. & Schult., Syst. Veg. 2: 95. 1817. Type: Italy. Collector unknown (holotype: TO).

Scirpus diphyllus Retz., Observ. Bot. 5: 15. 1789; *Fimbristylis diphylla* (Retz.) Vahl, Enum. Pl. 2: 289. 1805; *Fimbristylis annua* var. *diphylla* (Retz.) Kük., Repert. Spec. Nov. Regni Veg. 23: 196. 1926. Type: India. *Koenig s.n.* (holotype: C).

Scirpus villosus Poir. in Lamarck, Encycl. 6: 781. 1804; *Fimbristylis villosa* (Poir.) Roem. & Schult., Syst. Veg. 2. 98. 1817. Type: Puerto

Rico. *Ledrú s.n.* (holotype: probably B-Willd. 1264 or at P).

Fig. 50. F-J

Tufted perennial, (4-) 7-80 (-110) cm tall; rhizome short, ascending, thickened and nodose. Culms compressed-trigonous, coarsely ribbed and channeled, green, glabrous, 0.5-2 mm wide. Leaves 5-7 (-10) per culm; sheaths ligulate, finely nerved, glabrous or sometimes pilose, light reddish brown, the inner band pilose distally, ciliate along margins; ligule a horizontal band of dense appressed hairs at adaxial base of blade, ca. 0.5 mm wide; blades flattened to somewhat involute, 3-40 (-70) cm × 0.8-4 mm, to 5 mm wide basally, distinctly veined on both sides, glaucous, glabrous or pilose, antrorsely scabrous and sometimes ciliate on margins, the apex with a rounded curved tip. Inflorescence an open to contracted, simple to compound anthela with ascending rays, 1.5-10 (-15) cm diam.; involucral bracts 4-6, the lowermost ones, ciliate and pubescent proximally, to 10 cm long, usually equaling to overtopping the inflorescence, the upper ones linear to filiform; primary rays remotely scabrous on margins, to 7 (-11) cm long, secondary rays shorter; spikelets (3-) 10-60, ovoid to ovoid-lanceoloid or oblong-lanceoloid, 4-8 (-15) × 1.7-2.5 mm, acute, sub-rounded at base, solitary at ray tips, sometimes fasciculate; scales ovate to broadly ovate or oblong-ovate, 2.1-3 × 1.8-2.2 mm, glabrous, shiny, pale brown to reddish brown, usually dark brown distally, carina 3-nerved, pale green, prolonged beyond the acute to obtuse apex as a mucro, lateral nerves 3-4, indistinct. Stamens 1 or 2, the anthers 0.6-1 mm long, apiculate; styles 2-branched, the unbranched portion flattened, ca. 0.5 mm wide, fimbriate along margins. Achene biconvex, obovate, 1-1.3 × 0.8-1 mm, rounded and apiculate at apex, short-stipitate at base, whitish to stramineous or brownish, coarsely and deeply striate-reticulate with (5-) 7-9 (-12) longitudinal rows of horizontally oriented rectangular cells on each side, the longitudinal ribs between the cells prominent, smooth or sometimes sparsely tuberculate.

General distribution: Cosmopolitan, primarily in warm-temperate and tropical regions.

Distribution in Puerto Rico and the Virgin Islands: Damp often sandy soils in a wide variety of successional habitats including sandy savannas, forest edges, river banks, streams, ditches, agricultural fields, roadsides, grassy areas, lawns, waste places, and disturbed areas. Adjuntas, Aguada, Aguas Buenas, Aibonito, Añasco, Arecibo, Bayamón, Cabo Rojo, Caguas, Carolina, Cataño, Cayey, Ceiba, Coamo, Comerío, Corozal, Dorado, Fajardo, Guayama, Guaynabo, Gurabo, Humacao, Isabela, Jayuya, Juncos, Lares, Las Marías, Las Piedras, Loíza, Luquillo, Maricao, Maunabo, Mayagüez, Moca, Naguabo, Naranjito, Orocovis, Patillas, Peñuelas, Ponce, Quebradillas, Río Grande, Salinas, San Germán, San Juan, San Lorenzo, San Sebastían, Trujillo Alto, Utuado, Vega Alta, Vega Baja, Vieques, Villalba, Yabucoa, and Yauco; St. Croix, St. John, St. Thomas, Tortola, and Virgin Gorda.

Common name: Puerto Rico: *Junquito.*

Selected specimens examined: PUERTO RICO: Adjuntas: Rd. 10, km 32, *González-Más 877* (US). Aguas Buenas: Bo. Sumidero, *González-Más 1177* (US). Aibonito: *Liogier et al. 31445* (US). Añasco: *Heller 4531* (US). Arecibo: *Sargent 680* (US). Bayamón: *Heller & Heller* 411 (US). Cabo Rojo: Boquerón, Rd. 4, km 2.4, *González-Más 938* (US). Caribbean National Forest, along hwy. 988, *Boom 7064* (US). Cataño: Bo. Palo Seco, *Axelrod & Díaz 12709* (UPRRP). Guayama: Puerto Jobos, Rd. 707, *González-Más 653* (US). Guaynabo: P.R. Tropical Island Sonadora, *Woodbury et al. s.n.* (US). Gurabo: Substation Gurabo, *Woodbury et al. s.n.* (US). Humacao: km 27.1, *González-Más 72* (US). Juncos: *Sintenis* 2505 (US). Maricao: Bo. Indiera Fría, Along track near Río Lajas below El Salto de Curet, *Proctor & Padrón 45678* (US). Mayagüez: *Sintenis 96* (US). Moca: *Sargent 234* (US). Naguabo: Rd. 3; Daguao River, *González-Más 227* (US). Patillas: Rd. 3, km 144, Patillas to Maunabo, *González-Más 1334* (US). Ponce: Road from Ponce to Adjuntas, *Underwood & Griggs 757* (US); Reserva Forestal de Toro Negro, *Stimson 1514* (US). Río Grande: Along Rt. 186 bordering Caribbean National Forest, just N of the El Verde Field Station, *Strong et al. 392.* (GMUF); Luquillo Forest, Top of El Yunque Mt., *González-Más 1534* (US). San Juan: Río Piedras, *Stevenson 2012* (US). San Lorenzo: Sierra de Cayey, Carite Forest Reserve, *Proctor & Milety 43964* (US). San Sebastián: Bo. Cidral, *González-Más 925* (US). Utuado: Road from Utuado to Lares, *Underwood & Griggs 68* (US). Vega Baja: Tortuguero, Rd. 687, *González-Más 1045* (US). Vieques Island: Vicinity of Isabel, *Shafer 2502* (US). Yauco: Río Lares, *Sargent 665* (US). ST. JOHN: Bethamia to

Rosenberg, *N.L. Britton & Shafer 277* (US). St. Thomas: Crown, *N.L. Britton & Marble 1345* (US); Signalhill, *Eggers s.n.* (NA). Tortola: Road Town to High Bush, *N.L. Britton & Shafer 784* (US).

4. Fimbristylis ferruginea (L.) Vahl, Enum. Pl. 2: 291. 1805; *Scirpus ferrugineus* L., Sp. Pl. 50. 1753. Lectotype: Jamaica. *Herb. A. van Royen*, sheet no. 902.77-420 (L), designated by C. D. Adams in Cafferty & C. E. Jarvis (ed.), Taxon 53: 180. 2004.

Scirpus debilis Lam., Tabl. Encycl. 1: 141. 1791; *Scirpus ferrugineus* var. *debilis* (Lam.) Poir. in Lamarck, Encycl. 6: 780. 1804. Type: South America. *Richard s.n.* (holotype: probably at P).

Fimbristylis ferruginea var. *compacta* Kük., Repert. Spec. Nov. Regni Veg. 23: 196. 1926. Type: Cuba; Pinar del Río. *Ekman 17829* (holotype: B, destroyed).

Caespitose perennial, (12-) 20-110 (-140) cm tall; rhizomes short, stout. Culms compressed-trigonous proximally, compressed to subflattened distally, 0.7-3 mm wide, to 4 mm wide at base, coarsely ribbed, glabrous. Leaves 3-6 per culm; sheaths ligulate, finely and prominently nerved on back, pale green, glabrous, the inner band ferrugineous; ligule a horizontal band of pale, appressed hairs at adaxial base of blade, 0.3-0.4 mm wide; blades involute, 1-25 cm × 0.7-1.5 (-2) mm, light green to brown, glabrous, antrorsely scabrous on margins, abaxial surface distinctly nerved, the apex acute, often with a slightly curved tip. Inflorescence a simple or rarely compound, dense or sometimes somewhat head-like anthela with ascending rays, 1-4 (-8) cm diam.; involucral bracts (2-) 3-6, leaf-like, but reduced, flattened to somewhat involute, to 7 cm long, 0.8-1.4 mm wide, shorter the inflorescence or the lowermost one exceeding it; rays compressed, short, finely ribbed, the primary ones to 5 cm long; spikelets (1-) 3-14, ovoid to narrowly ovoid, 6-12 × 3-5 mm, solitary at ray tips; scales widely ovate to rounded-ovate, or oblong-ovate, boat-shaped, dorsally obtuse, 3-4 × 2.8-4 mm, pale reddish brown, with dense, silvery, short-appressed hairs and ciliate margins distally, lateral nerves indistinct, carina 1-nerved, green or grayish green, prolonged beyond the obtuse to rounded apex as a short, thickened mucro. Stamens 3, the anthers 0.9-1.3 mm long, bluntly apiculate at apex; styles 2-branched, the unbranched portion flattened, 0.4-0.5 mm wide, fimbriate on margins. Achene biconvex, obovate, 1.4-1.7 × 1-1.2 mm, obtuse to truncate at apex, bluntly apiculate, cuneate at base, short-stipitate, straw-colored to pale brown, finely and shallowly reticulate with 25-35 longitudinal rows of isodiametric cells.

General distribution: Pantropical.

Distribution in Puerto Rico and the Virgin Islands: Wet, brackish or saline coastal habitats, in marshes, estuaries, borders of mangroves, swampy areas, swales, pasture, and drainage canals. Aguadilla, Añasco, Arecibo, Arroyo, Bayamón, Cabo Rojo, Cataño, Cayo Icacos, Cayo Ramos, Coamo, Culebra, Fajardo, Guánica, Guayama, Humacao, Isabela, Isleta Marina, Jayuya, Loíza, Luquillo, Mayagüez, Ponce, Quebradillas, Río Grande, Salinas, San Juan, Santa Isabel, Toa Baja, Vega Baja, and Vieques; Anegada, St. Croix, St. John, St. Thomas, Tortola, and Virgin Gorda.

Selected specimens examined: Puerto Rico: Añasco: *Sargent 633* (US). Arecibo: Bo. Garrochales, Cienaga Tiburones, *Proctor et al. 46139* (US). Bayamón: *Sintenis 1234* (US). Cabo Rojo: Joyuda Road 102, *González-Más 613* (US). Cataño: Punta Salinas, *Liogier et al. 32494* (NY). Cayo Ramos: *Woodbury & Martorell 1* (US). Coamo: *Sintenis 3318* (US). Culebra Island: *N.L. Britton & Wheeler 250* (US). Fajardo: Bo. Quebrada Vueltas, between Rt. 3 and the sea, *Axelrod & L. Pérez 9074* (HAC). Guánica: *Sargent 192* (US). Guayama: Bo. Jobos, area S of oil refinery and E of port, *Axelrod & Pérez 8640* (US). Humacao: *Sargent 3004* (US). Mayagüez, *Heller 4367* (US). Ponce: Bo. Cañas, along dirt road to Punta Cucharas, *Axelrod & Chávez 7328* (US). Salinas: Rd. 3, km 156, *González-Más 1295* (US). San Juan: Stone quarry 2 mi. E of Santurce, *Heller & Heller 821* (US). Toa Baja: Bo. Sabana Seca, area behind Naval Station, N of Rt. 867, *Axelrod et al. 10214* (NY, US). Vega Baja: Bo. Cabo Caribe, between Los Naranjos & Caño Las Pozas, *Proctor et al. 45595* (US). St. Croix: Midland road, *J.J. Ricksecker 244* (US). St. Thomas: Long Cay, *Eggers s.n.* (NA, US).

5. Fimbristylis inaguensis Britton, Torreya 13: 216. 1913. Type: Bahamas; Inagua. *Nash & Taylor 1019* (holotype: NY!).

Rhizomatous perennial, 30-60 (-75) cm tall; rhizome short, knotty, often with old bulbous culm bases bearing fibrous remnants of leaf sheath bases. Culms solitary or 2-3 together, erect, rigid, subterete to terete proximally, subflattened distally, smooth, 1-2 mm wide. Leaves 7-13 per culm, spreading and often subdistichous; sheaths rigid, ligulate, often appressed-puberulent, pale brown to brown; ligule a band of pale or whitish coarse hairs, ca. 0.5 mm long, extending out along upper margin of the deeply V-shaped orifice; blades linear, stiffened, 10-60 cm × 0.8-3 mm, flattened or subinvolute, finely veined and green abaxially, smooth and whitish stramineous adaxially, appressed-puberulent basally above ligule, smooth to finely and densely antrorsely scabrous on margins (at least distally), glabrous, the apex abruptly narrowed to a flattened, acute or sub-rounded tip. Inflorescence an open or contracted, simple or compound, anthela with ascending rays, 4-8 cm diam.; spikelets 3-30, ovoid to ovoid-lanceoloid or ellipsoid, 6-13 (-15) × 2.5-3.3 mm, acute, sub-rounded at base, solitary at ray tips; scales ovate to widely ovate or oblong-ovate, 2.7-3.5 × 2.4-2.8 mm, dorsally obtuse to rounded, closely and often distinctly 7- to 9-nerved on each side above the narrowly scarious, often distally ciliate margins, yellowish brown, finely reddish lineolate, dull to semi-glossy, carina 3-nerved, included or slightly prolonged beyond the acute to obtuse apex as a short mucro. Stamens 3, the anthers 1.2-1.6 mm long, with a short, papillate apiculum; style 2-branched, flattened, the margins of the unbranched portion densely fimbriate. Achene unequally biconvex, obovate to broadly so or obpyriform, broadly rounded or truncate at apex, short-cuneate at base, 1.1-1.4 × 0.8-1.2 mm, pale to dark brown, finely reticulate with 22-37 longitudinal rows of horizontally oriented, rectangular to nearly isodiametric cells.

General distribution: Endemic to the Bahamas and Greater Antilles.

Distribution in the Virgin Islands: Coastal sands, in openings of strand vegetation along beaches. Only known in the flora area from Anegada.

Selected specimens examined: ANEGADA: West End, *N.L. Britton & Fishlock 966* (US); near West End, *D'Arcy 4811* (US).

6. Fimbristylis littoralis Gaudich. in Freycinet, Voy. Uranie 413. 1829. Type: Marianas, Molucca, or Timor Islands. Collector unknown (holotype: probably at P).

Scirpus miliaceus L., Syst. Nat. ed. 10, 2: 868. 1759, *nom. reject.* (see note below); *Fimbristylis miliacea* (L.) Vahl, Enum. Pl. 2: 287. 1805.

Densely tufted annual or short-lived perennial, 7-75 (-100) cm tall. Culms slender, erect to ascending, flexuous, firm distally, cross-shaped to somewhat 4-angled proximally or subflattened, 0.5-2 mm wide, to 3 mm wide at base, light green, glabrous, smooth or sparsely scabrous just below inflorescence, clothed with 2-3 bladeless sheaths at base. Leaves primarily basal, distichous, numerous, spreading and often fan-like; sheaths laterally flattened, 3-5 mm wide, soft and spongy, dorsally keeled, stramineous or pale green, glabrous, tapering gradually to blades; ligule absent; blades narrowly linear, soft, laterally compressed and essentially unifacial, 10-30 (-60) cm × 0.7-3 (-4) mm, glabrous, smooth proximally, spinulose-scabrous on margins distally, tapering evenly from base to attenuate, subacute, slightly dialated, pale tip. Inflorescence a compound or decompound anthela with ascending rays, 2-12 × 1.3-6 (-9) cm, bearing numerous spikelets; primary involucral bracts 2-6, setaceous, scabrous on margins, shorter than the primary rays 3-7, unequal, ascending, uppermost often divergent, 1-6 cm long, scabrous; spikelets solitary at ray tips, globose to globose-ovoid, 1.5-3 (-5) × 1.5-3 mm, with both ends rounded; scales ovate, 1-1.3 × 0.7-1 mm, cucullate at maturity, membranaceous, broadly white hyaline on the margins, carina 3-nerved, green or yellowish, rarely prolonged beyond the obtuse, rounded or emarginate apex. Stamens 1-2, the anthers 0.5-0.8 mm long, apiculate; style 3-branched, the unbranched portion slender, smooth or with some fimbriolae distally, pyramidal at base. Achene trigonous with convex sides, obovoid, 0.6-0.8 × 0.3-0.5 mm, rounded to an apiculate apex, cuneate to base, conspicuously cancellate with 5-7 longitudinal rows of fine, transversely oriented linear-oblong cells on each side, the longitudinal ribs frequently prominent and sparsely verruculose, translucent, pale brown to gray-brown.

General distribution: Southern United States, Mexico, Central America, West Indies, South America, Africa, Southeast Asia, Malesia, Australia, and Pacific islands and atolls, often weedy.

Distribution in Puerto Rico: In wet or damp sandy soils of river banks, marshy areas, swales, ditches, agricultural fields, pasture, roadsides, and disturbed areas. Caguas, Carolina, Cayey, Humacao, Naguabo, Patillas, San Juan, and Yabucoa.

Note: The name *Fimbristylis miliacea* has been used in two different senses based on two specimens of type material side by side in the Linnaean herbarium (LINN) which are different taxa. The first sheet, 71:40 is the species with ovoid spikelets, otherwise known as *Fimbristylis quinquangularis* and the second, 71:41, is the species with globose spikelets circumscribed by Vahl as *Fimbristylis miliacea.* Rejection of the name *Scirpus miliaceus* (*Fimbristylis miliacea*) was necessary to stabilize the nomenclature and eliminate the name as a source of confusion (see Strong, Taxon 53: 1069-1070. 2004).

Selected specimens examined: Puerto Rico: Caguas: Bo. Cañabón, along W side of Río Cagüitas just S of Rd. 156, *Proctor 46150* (US). Carolina: Sabana Abajo, P.R. 26, *González-Más 1238* (MAPR, NY, US). Cayey/Patillas: Rte. 179, ca. 2-3 mi. N of rte 742, *Axelrod & Taylor 9574* (UPRRP). Humacao: Entrada al pueblo, Carr. 3, km 68.8-9, *Montaño & González-Más 100* (MAPR). Naguabo: relict coconut plantation, ca. 0.8 km ESE of highway 3 bridge at mouth, *Proctor & Torres 50152* (SJ). San Juan: Bo. Hato Rey Norte, just S of Caño de Martín Peña, *Proctor & Cintrón 43106* (SJ). Yabucoa: *Sintenis 4947* (NY, US).

7. **Fimbristylis quinquangularis** (Vahl) Kunth, Enum. Pl. 2: 229. 1837; *Scirpus quinquangularis* Vahl, Enum. Pl. 2: 279. 1805; *Trichelostylis quinquangularis* (Vahl) Nees in Wight, Contr. Bot. India 104. 1834. Type: India. *Koenig s.n.* (holotype: C-Vahl).

Caespitose annual or short-lived perennial, (10-) 20-60 (-90) cm tall. Culms erect, slender, flexuous, cross-shaped or subflattened, antrorsely scabrous on margins just below inflorescence, 0.7-2 mm wide. Leaves 3-5 per culm, primarily basal, spirally arranged, the lowermost ones bladeless or essentially so; sheaths loose, thinly herbaceous, dilated at base, gradually narrowing to blade; ligule absent; blades linear, 3-40 cm × 1.3-3 (-4) mm, flattened to conduplicately folded, margins antrorsely scabrous (at least distally), blade and sheath surface adaxially scabrous proximally, otherwise glabrous, acuminate to a flattened, slightly curved tip. Inflorescence a compound to decompound anthela with ascending rays, 2.5-13 × 2-7 cm; involucral bracts 4-9, linear to linear-setaceous, shorter than the inflorescence; primary rays 7-16, unequal, several often reduced and unispiculate; spikelets (12-) 20-170 (-230), ovoid to ovoid-lanceoloid, 2.5-4 (-6) × 1.2-1.8 mm, acute, obtuse to sub-rounded at base; fertile scales ovate to broadly ovate, 1.1-1.5 × 0.8-1.2 mm, thinly herbaceous, dorsally acute to obtuse, curvate-keeled, brown to red-brown, glabrous, margins entire, broadly scarious, carina 3-nerved, greenish, prolonged beyond the acute to obtuse apex as a short slightly excurved mucro. Stamens 1-2, the anthers 0.5-0.6 mm long, apiculate; style 3-branched, the unbranched portion slender, trigonous, smooth. Achene obtusely trigonous to subterete, obovoid or pyriform, 0.6-0.8 × 0.4-0.6 mm, obscurely 3-costate, rounded at apex, apiculate, acute at base, short-stipitate, pale, finely cancellate-tuberculate with 3-6 vertical rows of horizontally oriented linear cells on each side.

General distribution: West Indies, South America, and Old World tropics, often weedy.

Distribution in Puerto Rico: Wet or damp sandy soils of ditches, river banks, marshy areas, swales, agricultural fields, pasture, roadsides, and disturbed areas. Aguada, Añasco, Carolina, Ceiba, Dorado, Gurabo, Humacao, Luquillo, Maunabo, Mayagüez, Naguabo, Río Grande, and Toa Baja.

Selected specimens examined: Puerto Rico: Aguada: *Sargent 561* (US). Carolina: 65 Inf. road, Río Grande Loíza banks, *González-Mas 1230* (US). Ceiba: Bo. Guayacán, Roosevelt Roads Naval Reservation, *Axelrod et al. 10863* (US). Humacao: Bo. Punta Santiago, beside Hwy 3 at Río Anton Ruiz bridge, *Proctor 44203* (US). Luquillo: Bo. Mata de Platano, in back of old coconut plantation, *Axelrod & Axelrod 6544*(US). Mayagüez: College campus, *González-Mas 2197* (US). Naguabo: Road 13, km 4.1, *González-Más 1366* (US).

8. Fimbristylis spadicea (L.) Vahl, Enum. Pl. 2: 294. 1805. *Scirpus spadiceus* L., Sp. Pl. 51. 1753. Lectotype: Jamaica. Sloane, *Voy. Jamaica 1: t. 76, f. 2. 1707*, designated by McVaugh, Fl. Novo-Galiciana 13: 380. 1993.
Fimbristylis castanea of authors, non (Michaux) Vahl, 1805.

Coarse, caespitose perennial, 60-200 cm tall; rhizome ascending or horizontal, ligneous. Culms erect, slender, compressed or subterete proximally, half-terete or obtusely trigonous distally, stiff, glabrous, 1.3-3 (-4) mm wide. Leaves numerous, ascending to erect; sheaths coriaceous, dark brown or purple-black proximally, smooth, the inner band reddish brown with a U-shaped orifice; ligule present on basal sheaths, a horizontal band of hairs, ca. 0.3 mm wide, often extending out along upper margins of sheath orifice, essentially absent on uppermost sheaths; blades narrowly linear, substiffened, crescentform to strongly involute, 10-100 cm × 0.5-1.5 (-2) mm, distinctly veined abaxially, smooth adaxially, light green to stramineous, antrorsely scabrous on margins, the apex with an acute, slightly curved tip. Inflorescence a terminal, open or contracted, compound anthela with ascending rays; involucral bracts 3-5, the lowermost one leaf-like, stiffly erect, equaling or exceeding the inflorescence; primary rays to 9 (-12) cm long; spikelets 10-60, ovoid-lanceoloid, lanceoloid, or narrowly ellipsoid, cylindrical, 6-17 (-20) × 2.7-3.5 (-4) mm, acute, short-cuneate at base, solitary at ray tips; scales broadly ovate, 2.8-4.2 (-5.5) × 2.5-3.8 mm, dorsally rounded, closely and faintly 7- to 9-nerved on each side above the narrowly scarious, often distally erose margins, smooth, dark brown to dark brown or red-brown, semi-glossy, carina 3-nerved, indistinct, pale, shortly prolonged beyond the broadly acute to obtuse apex as a short mucro. Stamens 2-3, the anthers 1.5-2 mm long, with a subulate, prickly apiculum; style 2-branched, the unbranched portion strongly flattened and fimbriate. Achene lenticular, obovoid or pyriform, 1.4-1.9 × 0.8-1.1 mm, rounded to subtruncate at apex, cuneate at base, finely cancellate, with 15-20 longitudinal rows of shallow to pitlike isodiametric cells, pale to deep brown.

General distribution: Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico and the Virgin Islands: Wet, sandy soils of coastal areas, in salt marsh, borders of mangroves, brackish marshland, swales, canals, and salt ponds. Arecibo, Arroyo, Cabo Rojo, Cataño, Guánica, Guayama, Guayanilla, Peñuelas, Ponce, Salinas, San Juan, Santa Isabel, and Yauco; St. Croix and St. Thomas. Reported for Anegada by D'Arcy in "Anegada Island: Vegetation and Flora", Atoll. Res. Bull. No. 188: 15. 1975, based on *D'Arcy 4811* and *4836* (both at MO).

Selected specimens examined: Puerto Rico: Arroyo: Guilarte Beach, *González-Más 1325* (US). Cabo Rojo: Bo. Pedernales, ca. 0.5 km E of Laguna Guanaquilla, *Proctor & McKenzie 43924* (US). Cataño: Palo Seco, Rd. 165, *González-Más 1166* (US). Guánica: *Sintenis 3871* (US). Guayama: Puerto Jobos, Rd. 707, *González-Más 691* (US). Guayanilla: *Sargent 161* (US). Peñuelas: Rd. 2, km 10.9, *González-Más 809* (US). Ponce: *Sintenis 4875* (US). Salinas: Rd. 705, km 1, *González-Más 722* (US). Santa Isabel: Rd. 1, km 110.5, *González-Más 755* (US). St. Croix: Limetree Bay, *J.J. Ricksecker 264* (US).

8. FUIRENA

Fuirena Rottb., Descr. Icon. Rar. Pl. 70, t.19. 1773.

Annual or perennial herbs, often pubescent; rhizomes of perennial species horizontal, scaly, producing roundish cormous offshoots in some species. Culms trigonous or terete, rarely pentagonous, coarsely or finely ribbed, green. Leaves basal and cauline, the lowermost often reduced to short-bladed or bladeless sheaths; sheaths well-developed, finely veined, pubescent; ligule a flange of membranous tissue, ciliate on margin with brownish hairs; blades linear, finely veined, often pubescent abaxially, smooth or sometimes pubescent adaxially, green. Inflorescence paniculate, composed of a terminal and series of lateral partial panicles with 2-many digitate, subdigitate or corymbose clusters of spikelets from the upper leaf-like bracts, or a single terminal head or cluster of spikelets; peduncles and branches pubescent;

spikelets ovoid to ovoid-lanceoloid or ovoid-ellipsoid, many-flowered, with subloosely spirally imbricate scales, the lowermost 1-3 scales occasionally empty; scales obovate to oblong-obovate, dorsally obtuse to rounded, pubescent or sometimes glabrous, with broad scarious margins, often reddish brown or grayish, the carina often prolonged at apex as a short or elongate, excurved mucro. Flowers bisexual; hypogynous bristles and/or bladed bristles 3 or 6, rudimentary, or wanting, when present, in one or two whorls, the outer whorl of 3 retrorsely barbed or smooth simple bristles, the inner whorl of 3 bladed bristles, rarely simple ones; stamens 1-3; style 3-branched. Achene trigonous with prominent angles, broadly ellipsoid or obovoid, slender-beaked at apex, often stipitate at base, the surface smooth, finely striated, or rarely tuberculate or cancellate. Approximately 30 species in warm temperate and tropical regions with the centers of distribution in Africa and the Americas.

TYPE: *Fuirena umbellata* Rottb.

References: Kral, R. 1978. A synopsis of *Fuirena* (Cyperaceae) for the Americas north of South America. Sida 7(4): 309-354. Muasya, A.M. 1998. A synopsis of *Fuirena* (Cyperaceae) for the flora of tropical East Africa. Kew Bull. 53(1): 187-202.

Key to the species of *Fuirena*

1. Leaf margins with ascending to appressed, stiff trichomes (at least proximally); spikelets 1.8-2.8 mm wide; achene bearing a whorl of 3 subulate bristles and a whorl of 3 bladed bristles; blades of bladed bristles narrowly oblong, thickened, obscurely 3-nerved, slightly incurved-apiculate or mucronate ..... 1. *F. robusta*
1. Leaf margins glabrous; spikelets 1.3-2.2 mm wide; achene bearing 3 bladed bristles only; blades of bladed bristles broad, oblong, obovate, or turbinate, thinly herbaceous, conspicuously 3- to 5-nerved, incurved-awned, the awn often coiled apically ..... 2. *F. umbellata*

1. Fuirena robusta Kunth, Enum. Pl. 2: 185. 1837. Type: Brazil. *Sellow s.n.* (holotype: B, destroyed).

Coarse, rhizomatous perennial, 80-170 (-225) cm tall; rhizomes short, horizontal, stout, 7-10 mm thick, producing cormous offshoots. Culms often rooting from lowermost nodes, erect, subcaespitose or crowded in a row, pentaquetrous, subspongy and easily compressed proximally, firm distally, glabrous, with conspicuous pale cells, 2.3-12 mm wide, to 18 mm wide (flattened) at base. Leaves 7-16 below inflorescence; sheaths elongate, subinflated, smooth, green or the lowermost brownish; ligule a thin, membranous, light brown, short-ciliate flange of tissue, 1-3 mm long; blades short proximally, elongate midculm and distally, lanceolate to linear-lanceolate or linear-oblong, 2-25 (-35) cm × 7-23 (-30) mm, essentially smooth except for hispid veins on both sides distally, margins with ascending to appressed, stiff trichomes (at least proximally), abruptly narrowed at apex and inrolled to a narrowly acute to acuminate tip. Inflorescence a terminal and series of 1-3, subcontiguous to remote, simple or compound, lateral partial corymbs from the upper leaf-like bracts; corymbs sublax, 1.5-7 cm diam., the spikelets in short, often lobate, fasciculate clusters at branch tips; spikelets ovoid to ovoid-lanceoloid, 5-8 (-10) × 1.8-2.8 mm, to 4 mm wide in fruit, acute to narrowly so, subrounded at base; scales ovate-elliptic, 2.5-3.3 × 1.7-2.5 mm, puberulent, reddish brown or greenish brown, finely cellular-striate, obscurely 2- to 4-nerved on sides, often coarsely beset distally, and along carina, with coarse tubercle-based translucent hairs, ciliate on margins, carina 3- to rarely 5-nerved, prolonged beyond the rounded or retuse apex as a narrowly lanceolate, antrorsely scabrous, erect awn, 0.5-2 mm long. Hypogynous segments 6, represented by a whorl of 3 subulate, antrorsely barbed to smoothish bristles which are as long as achene or slightly longer and a whorl of 3 bladed bristles which have ovate to narrowly ovate or ovate-elliptic clawed blades, 1-1.5 mm long, thickened, minutely cellular roughened-reticulate, obscurely 3-nerved, ciliate on margins distally, the acute apex with a slightly incurved scabridulous awn-like appendage. Stamens 3, the anthers 1-2 mm long, apiculate. Achene rhomboid with flat to slightly convex sides, 1-1.7 (including beak) × 0.6-0.9 mm, acute at apex with a trigonous-

subulate beak, abruptly attenuate to a stipitate base, pale brown to brown with wire-like angles, smooth, lustrous, the beak antrorsely barbed distally.

General distribution: Mexico, Panama, Cuba, Puerto Rico, and South America.

Distribution in Puerto Rico: Low, wet areas in marshy or swampy habitats. Known only from the Municipality of Florida from a collection made by *Woodbury s.n.* on 19 May 1968 (UPR; photo at US).

Note: Previously cited for Puerto Rico by Urban (1903) based on *Heller 247*. However, the US and NY duplicates of that collection are *F. umbellata* Rottb.

Selected specimens examined: PUERTO RICO: Florida: *Woodbury s.n.* (UPR; photo at US).

2. Fuirena umbellata Rottb., Descr. Icon. Rar. Pl. 70. 1773. Type: Surinam. *Rolander s.n.* (holotype: C-Rottb.).

Fig. 51. A-E

Rhizomatous perennial, (20-) 45-120 cm tall; rhizomes 4-6 mm thick, producing cormous offshoots. Culms erect or ascending, pentaquetrous, rib-angled, soft and easily compressed proximally, firm distally, glabrous or hispid near apex, 3-10 mm wide. Leaves 7-11 below inflorescence; sheaths elongate, subinflated, smooth to hirtellous or hispid; ligule a thin, membranous, brownish flange of tissue at junction of sheath and blade, short-ciliate; blades short proximally, elongate midculm and distally, linear-lanceolate, 4-30 cm × (4-) 7-20 (-25) mm, abaxially smooth, adaxially smooth to hispidulous, margins smooth proximally, antrorsely scabrous distally, narrowly acute to attenuate at apex. Inflorescence a terminal and series of 1-3, subcontiguous to remote, simple or compound, lateral partial corymbs from the upper leaf-like bracts; corymbs dense to sublax, 2-5 cm diam., the spikelets in dense, often lobate, spike-like clusters at branch tips; spikelets ovoid, ovoid-ellipsoid, ellipsoid-lanceoloid, or cylindrical, 4-8 (-10) × 1.3-2.2 mm, acute, sub-rounded at base; scales oblong to obovate, 2.2-3 × 1-1.3 mm, puberulent, strigillose, or rarely smooth, greenish brown to dark brown, finely cellular-striate, often coarsely beset distally, and on awn basally, with coarse tubercle-based translucent hairs, carina 3-nerved, prolonged beyond the rounded or retuse apex as an elongate, linear-lanceolate, antrorsely scabrous, excurved awn. Hypogynous segments represented by a single whorl of 3 bladed bristles with crimped claws, the blades oblong, obovate, or turbinate, 1.3-2 × 0.4-1 mm, obtuse, rounded, or emarginate, thinly herbaceous, 3- to 5-nerved, incurved-awned, the awn often coiled apically. Stamens 2 or 3, the anthers 0.6-0.9 mm long, apiculate. Achene broadly ovoid or broadly ellipsoid-obovoid with concave sides, 0.9-1.5 × 0.5-0.8 mm (including beak), stipitate, brownish, with pale, wire-like angles, faintly striate-cancellate, the beak smooth or papillate distally.

General distribution: Mexico, Central America, West Indies, South America, Africa, Asia, Malesia, Australia, and Pacific Islands.

Distribution in Puerto Rico: Low, wet areas in marshy or swampy places, forest openings, riversides, drainage canals, roadside ditches, pastures, agricultural fields, and disturbed areas. Aguada, Arecibo, Bayamón, Cataño, Ceiba, Cidra, Dorado, Fajardo, Guayama, Isabela, Lares, Luquillo, Manatí, Mayagüez, Naguabo, Patillas, Río Grande, San Juan, San Sebastián, and Vega Baja.

Selected specimens examined: PUERTO RICO: Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10746* (UPRRP, US). Cidra: Pueblo Viejo, *Hioram 92* (US). Lares, *Sargent 3252* (US). Manatí: Bo. Tierras Nuevas Saliente, area 0.7-1.4 km E of road 686 at Baldwin School (SE of El Pulguero), *Proctor & Concepción 42205* (US). Mayagüez: Las Mesas, *Holm 237* (US). Naguabo: Road off P.R. 191 to Pico del Este, *Pfeifer et al. 2551* (US). Patillas: Bo. Muñoz Rivera, *Axelrod & Weisel 11125* (UPRRP). Río Grande: Along Rt. 186 bordering Caribbean National Forest, *Kelloff et al. 366* (US). San Juan: 2 mi. E of Santurce, *Heller & Heller* 247 (US). San Sebastián, *Sargent 247* (US). Sierra de Luquillo, *Sintenis 1471* (US).

Excluded species

Fuirena squarrosa Michx., Fl. Bor.-Amer. 1: 37. 1803. Cited for western Puerto Rico by Urban (1903) and Britton & P. Wilson (1923) based on a determination by C. B. Clarke of a drawing done by Consul Krug. No historical specimens were seen during the preparation of this treatment, nor has it been collected recently on the island.

Fuirena simplex Vahl, Eclog. Amer. 2: 8. 1798. Cited by Kral (Sida 7: 334. 1978) for Puerto Rico. No historical specimens were seen during the preparation of this treatment, nor has it been collected recently on the island.

9. KYLLINGA

Kyllinga Rottb., Descr. Icon. Rar. Pl. 12. 1773, *nom. conserv.*

Small, slender perennials or rarely annuals, with creeping, elongate or short knotty rhizomes, or tufted. Culms 3-angled or obscurely so, smooth, glabrous. Leaves basal and often 1-2 lower cauline; sheaths often short, finely veined, the inner band membranous, closed at summit, with a concave to truncate orifice; ligule absent; blades when present flat or somewhat pleated, the margins and abaxial midvein scabrous, green, glabrous. Inflorescence a subglobose head of 1-3 (-4), crowded, sessile spikes; spikes cylindrical, ovoid, or globose, densely-flowered with slender rachis; spikelets ovate to lanceolate, flattened, 1-flowered, disarticulating at base when mature, falling entire, densely disposed on the rachis; scales 4, 2-ranked, the fertile scale ovate, folded, hyaline or membranous, with a scabrous or smooth keel, sometimes winged, mucronate or mucronulate and often recurved at apex, the sterile scales 2, minute, basal, the apical scale similar to the fertile one, often sterile, rarely staminate. Flowers bisexual and staminate; hypogynous squamellae or bristles absent; stamens 1-3, the anthers oblong-elliptic to linear, apiculate at apex; style 2-branched, the unbranched portion uniform at base. Achene laterally flattened with one angle facing the rachilla, narrowly ovate to oblong or elliptic, obtuse to sub-rounded or subtruncate at apex, apiculate, cuneate to rounded at base, substipitate to distinctly stipitate, the surface puncticulate. A primarily pantropical genus of approximately 40 species, 8 of which occur in temperate, subtropical and tropical regions of the New World.

TYPE: *Kyllinga nemoralis* (J. R. Forst. & G. Forst.) Dandy ex Hutchinson & Dalz. (≡ *Thryocephalon nemorale* J. R. Forst & G. Forst.), *typ. conserv.*

Reference: Tucker, G.C. 1984. A revision of the genus *Kyllinga* Rottb. (Cyperaceae) in Mexico and Central America. Rhodora 86: 507-538.

Key to the species of *Kyllinga*

1. Spikelet scales obliquely shaped from the broadly winged keel with closely spinulose-scabrous margin, snowy white, becoming tawny or whitish brown at maturity, variegated with reddish brown .....2. *K. nemoralis*
1. Spikelet scales uniform, curvate-keeled, unwinged and regularly or remotely spinulose-scabrous on keel, or rarely entire, white, whitish brown, greenish, or pale brown. 2
   2. Plants with horizontally creeping rhizomes, the culms forming in a row..... 3
      3. Lowermost involucral bract erect, leaflike but appearing like a continuation of the culm .....1. *K. brevifolia*
      3. Lowermost involucral bract ascending to reflexed, rarely erect..... 4
         4. Involucral bracts 3-7 (-20) mm long, subcucullate; spikes globose; denuded rachis spherical to hemispherical ..... 5. *K. tibialis*
         4. Involucral bracts 10-30 (-80) mm long, flattened; spikes subglobose to ovoid; denuded rachis cylindrical to conical ..... 6. *K. vaginata*
   2. Plants with short rhizomes or rhizomes lacking, the culms caespitose or tufted, not forming in a row..... 5
      5. Perennial; culms loosely caespitose; basal sheaths short, brown, scarcely tinged with red; scales whitish with pale or light green keel; anthers 0.6-0.8 mm long; achene maturing reddish brown to dark brown with 0.2-0.3 mm wide, broadly short-stipitate base..... ..... 3. *K. odorata*

5. Annual or short-lived perennial; culms in dense tufts; basal sheaths red-tinged with dark red veins; scales pale brown with conspicuous green or dark green keel; anthers 0.2-0.4 mm long; achene maturing light brown with 0.1 mm wide, narrowly short-stipitate base .....4. *K. pumila*

1. Kyllinga brevifolia Rottb., Descr. Icon. Rar. Pl. 13. 1773; *Cyperus brevifolius* (Rottb.) Hassk. Cat. Hort. Bot. Bogor. 24. 1844. Type: East Indies. *Koenig s.n.* (holotype: C-Rottb.; isotype: C-Rottb.).

Kyllinga monocephala sensu Thunberg, Fl. Jap. 35. 1784; and Grisebach, Fl. Brit. W. I. 568. 1864, non Rottbøll, 1773.

Kyllinga cruciformis Schrad. ex Schult., Mant. 2: 137. 1824. Type: St. Thomas, U.S. Virgin Islands. *Ehrenberg 69* (holotype: B, destroyed; isotypes: C, HAL).

Rhizomatous perennial, (3-) 7-42 (-57) cm tall; rhizome long-creeping, scaly, 2-3 mm thick. Culms loosely caespitose at first, later narrowly to widely spaced along the rhizome, forming in a row, soft, triquetrous, deeply channeled, 0.6-1.2 (-1.5) mm wide, with 2-3 mm wide sheathing bases. Leaves 2-4; sheaths short, basal and lower cauline, the lowermost bladeless, basal ones brownish or at most slightly reddish tinged, the inner band reddish brown lineolate; blades 1-15 (-20) cm × 1.5-3.5 (-4) mm, flattened. Involucral bracts 3 (-4), leaf-like, 3-15 (-20) cm long, the lowest erect, appearing as a continuation of the culm, the upper ones ascendent to horizontally spreading or reflexed; spike 1, globose or broadly ovoid-globose to cylindrical, 4-8 (-9) × (4-) 5-6 (-7) mm; spikelets (20-) 40-60 (-100), elliptic-lanceolate, 2-3 (-3.5) × 0.6-0.9 (-1.2) mm; fertile scales ovate-elliptic, 2-2.8 × 1-1.6 mm, submembranous, dingy to pale brown or greenish, variegated with reddish brown, laterally 2-3 nerved, keel green, unwinged, spinulose-scabrous, often remotely so, rarely entire, prolonged at apex as a short, recurved cusp. Stamens (1) 2, the anthers 1-1.2 mm long. Achene elliptic to oblong-elliptic or elliptic-obovate, 1-1.5 × 0.6-0.9 mm, broadly rounded to subtruncate at apex, short-cuneate at base, yellowish brown to brown.

General distribution: Southeastern United States, Mexico, Central America, West Indies, South America, and Old World Tropics.

Distribution in Puerto Rico and the Virgin Islands: Wet to moist meadows, roadsides, ditches, gravel washes, river banks, lawns, pastures, pond margins, forest edges, and disturbed areas. Adjuntas, Aguas Buenas, Añasco, Arecibo, Arroyo, Bayamón, Cabo Rojo, Caguas, Canóvanas, Carolina, Cataño, Cayey, Ceiba, Dorado, Fajardo, Guayama, Humacao, Loíza, Luquillo, Manatí, Maricao, Mayagüez, Naguabo, Patillas, Peñuelas, Ponce, Río Grande, Salinas, San Germán, San Juan, San Sebastián, Toa Baja, Trujillo Alto, Vega Alta, Vega Baja, Villalba, and Yabucoa; St. Croix, St. Thomas, and Tortola.

Selected specimens examined: Puerto Rico: Adjuntas: Rd. 10, km 9, *González-Más 869* (US). Arroyo: Playa Guilarte, *González-Más 1314* (US). Bayamón: Rd. 2, km 14.6, *González-Más 1130* (US); Hato Tejas, *Goll 247* (US). Cataño: Palo Seco, *González-Más 2105* (US). Dorado: Rd. 693 to Cerro Gordo, *González-Más 337* (US). Guayama: Pto. Jobos, Rd. 707, *González-Más 698* (US). Humacao: *González-Más 1350* (US). Luquillo: Luquillo Forest, road towards top of El Yunque Mt, *González-Más 1553* (US). Manatí: Bo. Tierras Nuevas Saliente, *Axelrod et al. 10962* (UPRRP). Maricao: Rd. 120, *González-Más 427* (US). Mayagüez: *Sintenis 13* (US). Naguabo: Rd. 3, Daguao River, *González-Más 215* (US). San Juan: At Río Piedras Experimental Station, *Woodbury s.n.* (US). San Sebastián: entrance to town near baseball park, *González-Más 1480* (US). Toa Baja: Bo. Sabana Seca, area S of Rt. 867, near Naval Station, *Axelrod & Pérez 9828* (US).Vega Alta: Rd. 2, km 30.8, *González-Más 1110* (US). Villalba: New road under construction to Jayuya, *González-Más* 2193 (US); Reserva Forestal de Toro Negro, *Stimson 1473* (US).. Yabucoa: Rd. 3, km 96.2, *González-Más 1344* (US). St. Croix: Spring garden, *A.E. Ricksecker 479* (US). St. Thomas: St. Peter, *Eggers s.n.* (NA); *Eggers s.n.* (US). Tortola: Road Town to High Bush, *N.L. Britton & Shafer 790* (US).

2. Kyllinga nemoralis (J. R. Forst. & G. Forst.) Dandy ex Hutchinson & Dalz., Fl. W. Trop. Afr. 2: 486. 1936; *Thryocephalon nemorale* J. R. Forst & G. Forst., Char. Gen. Pl. 65, t.

65. 1775; *Cyperus kyllinga* Endl., Cat. Horti Vindob. 1: 94. 1842, *nom. illeg.* Lectotype: Society Islands; Otaheite. *Forster & Forster s.n.* (BM), designated by Nicolson, Forsters: 184. 2004.

Kyllinga monocephala sensu G. Forster, Fl Ins. Austr.: 6, n. 30. 1786, non Rottbøll, 1773 (which is a *nom. superfl.* for *Schoenus coloratus* L., 1753).

Kyllinga triceps sensu G. Forster, Fl. Ins. Aust.: 7, n. 31. 1786, non Rottbøll, 1773 (which is a *nom. superfl.* for *Scirpus glomeratus* L., 1753).

Rhizomatous perennial, 7-45 cm tall; rhizome long-creeping, scaly, 2-3 mm thick. Culms narrowly to widely spaced along the rhizome, firm but flexuous, triquetrous or trigonous proximally, 0.7-1.1 mm wide, with 2-3 mm wide sheathing bases. Leaves 3-6, the basal ones often bladeless; sheaths lower cauline, pale brown to brown or purplish brown; blades 8-30 cm × 2-3.5 (-5) mm, flattened. Involucral bracts 3-4, leaf-like, to 30 cm long, horizontally spreading to reflexed, rarely the lowermost erect; spikes 1 (-3), globose, the terminal one 5-8 (-10) × 5-8 mm, lateral secondary spikes smaller; spikelets 100-200, obliquely ovate-elliptic to ovate-lanceolate or elliptic-lanceolate, 2.7-3.5 × 1-1.8 mm; fertile scales oblique from the broadly winged keel, ovate, 2.5-3.5 × 1-2 mm, submembranous, white to brownish white or pale brown at maturity, variegated with reddish brown, laterally 3-4 nerved, keel green, broadly winged with closely spinulose-scabrous margin, prolonged at apex as a short, recurved mucro. Stamens 3, the anthers 0.5-1 mm long. Achene elliptic-obovate to oblong-obovate, 1.2-1.5 × 0.5-0.8 mm, obtuse to sub-rounded at apex, short cuneate at base, yellowish brown to dark brown or blackish at maturity.

General distribution: Tropics and subtropics of Africa, Asia, Malesia, Australia, and the Pacific region including Hawaii. Introduced in the Neotropics where it has been found in Dominica, Puerto Rico, and reported from Brazil.

Distribution in Puerto Rico: Roadsides and roadbanks, pastures, lawns, weedy lots, disturbed areas, and waste places. Arecibo, Arroyo, Caguas, Carolina, Comerío, Fajardo, Guaynabo, Gurabo, Humacao, Manatí, Mayagüez, Naguabo, Ponce, Río Grande, San Juan, Trujillo Alto, and Utuado.

Selected specimens examined: Puerto Rico: Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10713* (US). Gurabo: Bo. Jaguas, Finca Laing, 1.3 km due NNW of Escuela Jaguas, *Proctor 45129* (US).

3. Kyllinga odorata Vahl, Enum. Pl. 2: 382. 1805. Type: South America. *Rohr s.n.* (holotype: C).

Kyllinga sesquiflora Torr., Ann. Lyceum Nat. Hist. New York 3: 287. 1836; *Cyperus sesquiflorus* (Torr.) Mattf. & Kük. in Engler, Pflanzenr. IV. 20 (Heft 101): 591. 1936. Type: United States, Florida. *Chapman 12* (holotype: NY).

Fig. 50. K-N

Tufted perennial, 4-30 cm tall; rhizome short, nodose; plant fragrant with odor of citronella. Culms crowded along nodes of the rhizome, obscurely 3-angled, somewhat compressed, distinctly ribbed, 0.5-1.2 mm wide. Leaves 5-20; sheaths pale brown to brown, reddish tinged, the membranous inner band red-dotted; blades 3-18 (-30) cm × 2-3 (-4) mm, many-veined, glabrous, the apex long-acuminate. Involucral bracts (1-) 3 (-4), leaf-like, 1-8 (-12) cm × 1-3 mm, exceeding the inflorescence; spikes 1-3, ovoid to cylindrical, the terminal one 5-12 × 5-8 mm, lateral spikes generally smaller; spikelets ovate to ovate-lanceolate, 2-3 × 1-1.2 mm; fertile scales broadly ovate, 2-2.7 × 1.2-2 mm, curvate-keeled, 3-4 nerved on each face, glabrous, whitish to pale brown at maturity, minutely red-lineolate, the keel recurved at apex, short mucronate, smooth or remotely spinulose-scabrous towards base. Stamens 2, the anthers 0.6-0.8 mm long. Achene oblong-ovate, 1.2-1.5 × 0.7-1 mm, broadly rounded to subtruncate at apex, sub-rounded at base, broadly stipitate, with a 0.2-0.3 mm wide whitish or stramineous stipe, reddish brown to dark brown.

General distribution: Pantropical, southeastern United States to eastern Texas, Mexico, Central America, West Indies, South America, tropical Africa, Madagascar, southeast Asia, Malesia, and northern Australia.

Distribution in Puerto Rico and the Virgin Islands: Wet ground in pastures, lawns, roadsides, and gravel washes. Adjuntas, Bayamón, Corozal, Loíza, Mayagüez, Salinas, San Juan, and Vega Baja; St. John and St. Thomas.

Selected specimens examined: Puerto Rico: Mayagüez: Bo. Miradero, *González-Más 1498*

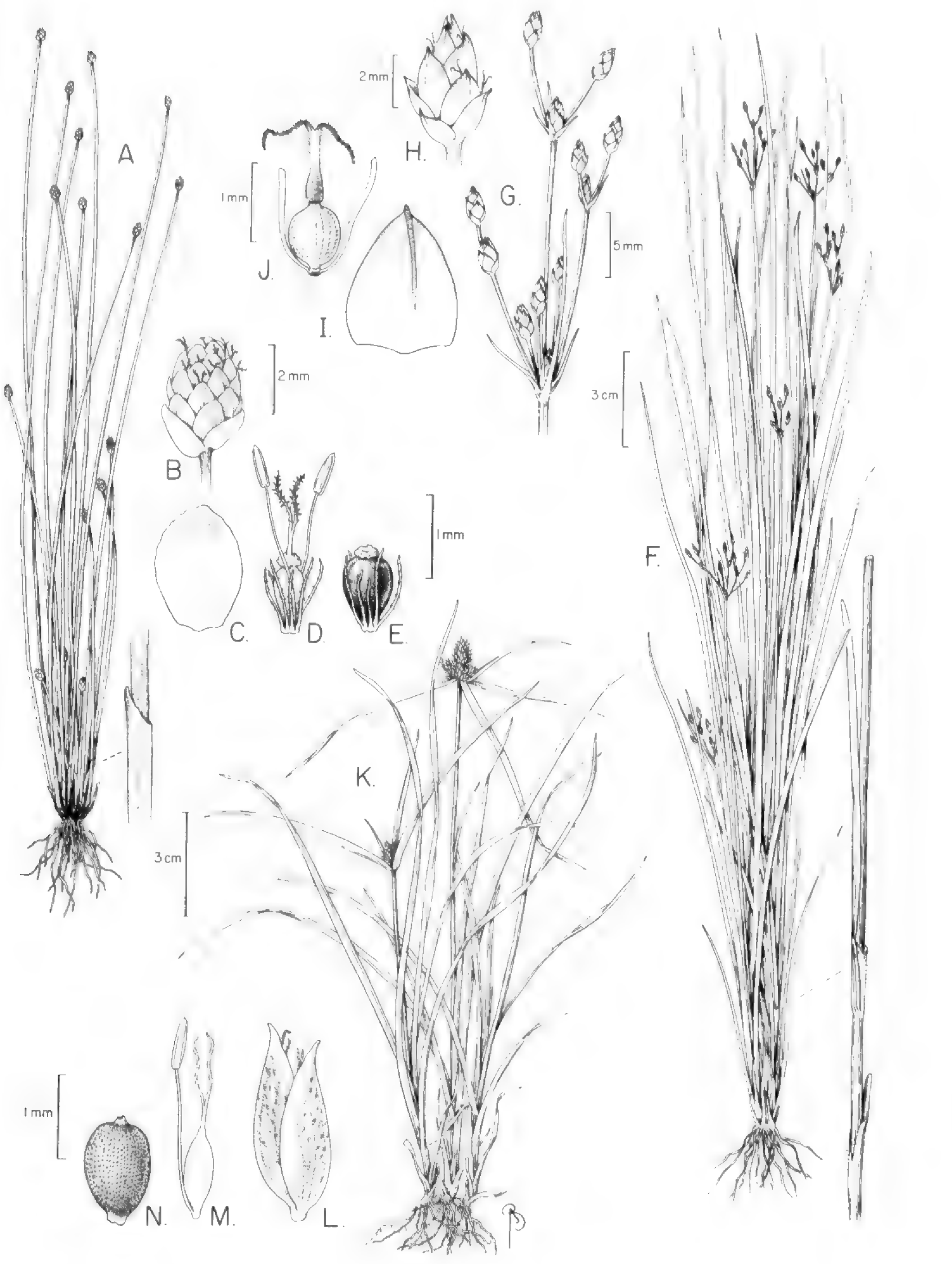


Fig. 50. A-E. *Eleocharis geniculata.* **A.** Habit and detail of culm showing sheath apex. **B.** Spikelet. **C.** Spikelet scale. **D.** Flower. **E.** Achene. **F-J.** *Fimbristylis dichotoma.* **F.** Habit, and detail of culm showing apex of sheaths. **G.** Inflorescence. **H.** Spikelet. **I.** Spikelet scale. **J.** Achene with style still attached. **K-N.** *Kyllinga odorata.* **K.** Habit. **L.** Spikelet. **M.** Flower. **N.** Achene. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

(US). Vega Baja: Laguna Yeguada, near Vega Baja, *Britton et al. 6772* (NY). St. John: Rosenberg, *N.L. Britton & Shafer 304* (US). St. Thomas: *Eggers s.n.* (NA).

4. Kyllinga pumila Michx., Fl. Bor.-Amer. 1: 28. 1803; *Cyperus densicaespitosus* Mattf. & Kük. ex Kük. in Engler, Pflanzenr. IV. 20 (Heft 101): 597. 1936. Type: United States; Illinois. *Michaux s.n.* (holotype: P: isotype: P).

Kyllinga flexuosa Boeck., Beitr. Cyper. 2: 1. 1890. Type: Jamaica. *Eggers 3753* (holotype: B, destroyed).

Kyllinga odorata sensu Duss, Ann. Inst. Col. Marseille 3: 543. 1897, non Vahl, 1805.

Densely tufted annual or short-lived perennial, 7-40 (-65) cm tall. Culms firm but flexuous, triquetrous distally, often trigonous near base, finely and coarsely ribbed and deeply channeled, 0.7-1.3 mm wide. Leaves 3-5, the basal ones often bladeless; sheaths elongate, the basal ones pink tinged or reddish with dark red veins; blades 4-20 (-30) cm × 1.5-3 (-3.8) mm, flattened to V-shaped. Involucral bracts 3-5, leaf-like, slightly ascending to horizontal, rarely the lowermost erect; spikes 1-3, globose-ovoid to cylindrical, the terminal one 5-8 (-10) × 4-8 mm, lateral secondary spikes smaller; spikelets 50-150, lanceolate to oblong-lanceolate, (1.9-) 2.3-3 (-3.8) × 0.7-1.1 mm; fertile scales ovate, 1.8-3.1 (-3.4) × 1-1.7 mm, pale brownish to hyaline, laterally 2-4 nerved, the keel green, unwinged, with 3-10 antrorsely spinulose-scabrous barbs, up to 0.2 mm long, rarely smooth, prolonged at apex as a short mucro. Stamens 2, the anthers 0.2-0.4 mm long. Achene ellipsoid-obovoid to oblong-obovoid, 1-1.2 (-1.4) × 0.5-0.7 mm, subtruncate at apex, cuneate to sub-rounded at base, light brown to yellow-brown.

General distribution: Eastern United States south to Texas, Mexico, Central America, West Indies, South America, and tropical Africa.

Distribution in Puerto Rico: Wet soils in meadows, pastures, roadsides and road banks, ditches, along trails in forested areas, gravel washes, river banks, irrigation ditches, lawns, and disturbed open areas. Adjuntas, Aibonito, Arroyo, Barranquitas, Caguas, Carolina, Cayey, Ceiba, Fajardo, Humacao, Jayuya, Luquillo, Maricao, Mayagüez, Naguabo, Orocovis, Ponce, Río Grande, San Juan, San Lorenzo, Santa Isabel, Utuado, and Villalba.

Selected specimens examined: Puerto Rico: Adjuntas: *Sintenis 4612* (US). Barranquitas: *Sargent 367* (US). Caguas: Mil. Road, 9 mi. pt., *Heller & Heller 1401* (US). Humacao: Coto Nabú, km 27.1, *González-Más 61* (US). Maricao: Rd. 109, Maricao to Mayagüez, *González-Más 1587* (US). Naguabo: Sierra de Luquillo, Caribbean National Forest, Rd. 191, km 20, *Proctor & Thomas 43201* (US). Río Grande: Sierra de Luquillo, Caribbean National Forest, *Proctor 42072* (US). San Juan: Río Piedras, *Stevenson 1808* (US). Utuado: Vicinity of Utuado, *N.L. Britton & Cowell 414* (US). Villalba: near Salto Doña Juana, *González-Más 2190* (US).

5. Kyllinga tibialis Poit. ex Ledeb. in Ledebour & Alderstam, Diss. Bot. Pl. Doming. 6. [May] 1805. Type: Haiti. *Poiteau s.n.* (holotype: LE).

Mariscus aphyllus Vahl, Enum. Pl. 2: 373. [Oct.] 1805; *Kyllinga aphylla* (Vahl) Kunth, Enum. Pl. 2: 127. 1837. Type: Senegal. *Dupuis s.n.* (holotype: C-Vahl).

Kyllinga peruviana var. *foliata* Kük., Repert. Spec. Nov. Regni Veg. 12: 92. 1913; *Cyperus peruvianus* var. *foliatus* (Kük.) Kük. in Engler, Pflanzenr. IV. 20 (Heft 101): 587. 1936. Type: Jamaica. *Britton & Hollick 2705* (holotype: B, destroyed; isotype: NY!).

Rhizomatous perennial, (15-) 20-75 (-98) cm tall; rhizome horizontally-creeping, hardened, bearing finely and closely veined brown to reddish brown scales, 3-6 mm thick. Culms arising singly from each node of the rhizome, arranged in a row, narrowly spaced, rounded trigonous proximally to obtusely trigonous distally, hollow but thick-walled, somewhat firm but fairly easily compressed, finely longitudinally striate, finely to coarsely ribbed and channeled, 1.5-3.5 mm wide, sheathing base 2-6 mm wide. Leaves 3-7, often bladeless; upper sheaths elongated, 3-12 cm long, finely veined, reddish lineolate or speckled adaxially, cinnamon-colored, those lacking blades with an obliquely truncate, conspicuously cinnamon-brown, scarious orifice, the inner band membranous, reddish lineolate or speckled; basal sheaths short, cataphylloid, pale brown, tinged with red; blades, when present, flattened to subinvolute, finely veined, 1-8 cm × 3-7 mm, margins scabrellate near apex. Involucral bracts 3-4, short, scarious-

margined proximally, often antrorsely spinulose-scabrous on margins distally, 3-7 (-20) mm long, subcucullate, often divergent to reflexed at maturity, the apex acute to acuminate with a stiff, thickened tip; spike 1, globose, 7-12 mm in diam., the rachis spherical to hemispherical; spikelets 100-200, broadly to narrowly elliptic-lanceolate, (3-) 3.2-3.8 (-4.5) × 1-1.4 mm; fertile scales ovate, 2.5-3.3 × 1.6-2 mm, submembranous, greenish or brownish white, semi-glossy, laterally 5- to 7-nerved, keel whitish or greenish, unwinged, entire or with 1-3 spinulose teeth, 3-nerved, prolonged as a short mucro at apex. Stamens 3, the anthers 0.8-1.3 mm long, apiculate at apex. Achene oblong-obovate, 1-1.5 × 0.7-0.9 mm, broadly rounded to subtruncate at apex, cuneate at base, orangish brown to reddish brown.

General distribution: West Indies, Central America, the Caribbean coast of Colombia, and tropical West Africa.

Distribution in Puerto Rico: Primarily coastal, on wet gravels and sands, in sand dunes, wet meadows, marshes, ditches, roadsides, and disturbed areas. Añasco, Cataño, Cayo Palominitos, Ceiba, Humacao, Loíza, Luquillo, Manatí, Mayagüez, Naguabo, Río Grande, San Juan, and Vega Baja.

Selected specimens examined: PUERTO RICO: Añasco: *Sargent 637* (US). Ceiba-Naguabo: Caribbean National Forest, *Axelrod & Grose 11211* (UPRRP). Humacao: Playa de Humacao, *Eggers 595* (US); to Ceiba, km 76.7, *González-Más 76* (US); *González-Más 249* (US). Mayagüez: *N.L. Britton 2359* (US); *Sintenis 130* (US). Naguabo: Rd. 191, km 14.7, Sierra de Luquillo, El Yunque, *González-Más 1412* (US).

6. Kyllinga vaginata Lam., Tabl. Encycl. 1: 148. 1791; *Kyllinga peruviana* Lam., Encycl. 3: 366. 1792, *nom. illeg.*; *Cyperus peruvianus* F. N. Williams, Bull. Herb. Boiss., ser. 2. 7: 90. 1907. Type: Peru. *Dombey s.n.* (lectotype: P-Lam., photo at DUKE; isolectotype: C), designated by G. C. Tucker, Rhodora 86: 525. 1984.

Kyllinga pungens Link, Hort. Berol. 1: 326. 1827. Type: not located.

Kyllinga obtusata J. Presl & C. Presl in C. Presl, Reliq. Haenk. 1: 183. 1828; *Cyperus obtusatus* (J. Presl & C. Presl) Mattf. & Kük. in Engler, Pflanzenr. IV. 20 (Heft 101): 585. 1936. Type: Peru. *Haenke s.n.* (holotype: PR).

Rhizomatous perennial, 15-70 (-105) cm tall; rhizome horizontally creeping, knotty, hardened, bearing light brown to brown scales which often have reddish veins, 2.5-4.3 mm thick. Culms arising singly from each node of the rhizome, arranged in a row, narrowly to widely spaced, trigonous, hollow, easily compressed, finely and coarsely ribbed, (0.6-) 0.8-2 mm wide, the sheathing bases 1.8-4 mm wide. Leaves 3-5, basal and lower cauline, upper blade-bearing, lowermost bladeless; blade-bearing sheaths 2-10 cm long, with a concave to U-shaped orifice; upper bladeless sheaths prolonged dorsally, with an acute to short-acuminate, mucronate apex, light brown, the membranous inner band red- or black-speckled; basal sheaths cataphylloid, pale brown, reddish lineolate; blades, when present, short, 1-12 cm × 2-4.5 mm, flattened, finely veined, semi-glossy and finely cellular-reticulate adaxially, margins and abaxial midvein scabrellate, short-acuminate to acute at apex. Inflorescence a single, subglobose to ovoid spike at the summit of the culm, 7-11 mm in diam., the rachis cylindrical to conical with 70-200 (-250) spikelets; involucral bracts 2-4, leaf-like, 1-5 (-8) cm long, acuminate to a triquetrous tip, spreading horizontally, often divergent to reflexed at maturity; spikelets elliptic-lanceolate, 2.7-4 × 1-1.5 mm, flattened, acuminate at apex, short-cuneate at base; fertile scales ovate, 2.4-3.4 × 1.6-2.2 mm, thinly herbaceous, whitish to pale reddish brown, laterally 3-4 (-5) nerved, keel whitish or greenish, unwinged, with 2-4 spinulose teeth, prolonged as a short, slightly recurved mucro at apex. Stamens 3, the anthers 0.9-1.3 mm long, apiculate at apex. Achene oblong-ellipsoid, 1-1.3 × 0.4-0.7 mm, broadly rounded at apex, cuneate at base, light brown.

General distribution: Greater Antilles, Central America, South America, and tropical Africa.

Distribution in Puerto Rico and the Virgin Islands: Wet meadows, roadsides, and coastal sands. Añasco, Humacao, Mayagüez, and Río Grande; cited for St. Croix by Britton (1918) and Fosberg, Rhodora 78: 85. 1976.

Selected specimens examined: PUERTO RICO: Añasco: *Sargent 638* (US). Mayagüez: *Sintenis 13* (US).

10. LAGENOCARPUS

Lagenocarpus Nees, Linnaea 9: 304. 1834.

Rhizomatous, monoecious or dioecious perennials; rhizomes short and stout, often vertical, sometimes emitting scaly stolons. Culms central, erect, trigonous or subtriquetrous, stiff, subhardened. Leaves basal and often cauline, with well-developed blades or reduced to bladeless cataphylls; sheaths elongate, the inner band prolonged as a rounded-deltate contraligule at the orifice; ligule absent; blades linear, 1- to 3-costate, plicate or subflattened, thickly herbaceous, substiffened. Inflorescence a compound panicle often consisting of a terminal and series of cymose partial panicles from the upper leaf-like bracts, these remote to subcontiguous, the lower ones staminate and the upper pistillate in monoecious plants; spikelets unisexual, oblong-ellipsoid or ellipsoid-obovoid; staminate spikelets many-flowered, borne singly or in clusters or glomerules at branch tips; pistillate spikelets bearing a single terminal floret, with 4-6 empty (sterile) scales below, borne singly or rarely paired; scales often pubescent, mucronate or short-awned. Flowers spirally imbricate; hypogynous squamellae typically 3 or wanting, minute and often inconspicuous, scale-like or rarely bristle-like, long-pilose, ciliolate, or entire on margins; stamens 1 or 2 (-6); style 3-branched. Achene trigonous or obtusely so, flask-shaped or bottle-shaped, sometimes beaked, estipitate or sometimes short-stipitate, smooth or pitted, rarely pubescent, often trisulcate or tricostate on margins. Approximately 30 species with Neotropical distribution: Central America, West Indies, and South America.

TYPE: *Lagenocarpus guianensis* Nees

References: Koyama, T. 1965. Cyperaceae tribe Lagenocarpeae. Mem. New York Bot. Gard. 12: 8-54. Nees von Esenbeck, C.G.D. 1842. Cyperaceae. Pp. 1-226. *In*: C. Martius, Fl. Brasiliensis 2 (1).

1. Lagenocarpus guianensis Nees, Linnaea 9: 304. 1834; *Scleria guianensis* (Nees) Steud., Syn. Pl. Glumac. 2: 177. 1855. Type: Guyana. possibly *Schomburgk s.n.* (holotype: CGE [edges of sheet trimmed off, no inscription on back], photocopy of CGE at US).

Lagenocarpus portoricensis Britton, Bull. Torrey Bot. Club 50: 55. 1923. Type: Puerto Rico. *Underwood & Griggs 946* (holotype: NY!; isotype: US!).

Lagenocarpus tremulus sensu Urban, Symb. Antill. 4: 126. 1903, non Nees von Esenbeck, 1843.

Fig. 51. F-K

Dioecious perennial, 75-150 (-200) cm tall; rhizome vertical, short and stout, 2-3 cm thick, bearing fibrous remnants of old leaf sheath bases, sometimes emitting coarse scaly stolons. Culms solitary or loosely caespitose, subtriquetrous to trigonous proximally, obtusely trigonous to subterete distally, antrorsely appressed-hispidulous, glabrescent, 3-12 mm wide near base; sheathing bases 1-3 cm wide. Leaves numerous, basal and cauline; sheaths distinctly veined, septate-nodulose, basal ones slightly spongy-thickened, glabrescent, pale brown to brown proximally, often tinged with red, contraligule rounded-deltate, stiff, ciliate on margin; blades 30-150 cm × 6-23 mm, plicate to subflattened, septate-nodulose adaxially and abaxially, often inconspicuously so, antrorsely scabrous on margins, abaxial midcosta, and adaxial lateral costate, long-acuminate to triquetrous apex. Inflorescence paniculate, composed of a terminal and series of 5-9 lateral, cymose, trullate partial panicles from the upper leaf-like bracts, sometimes 2 from a single node, 3-20 × 1-6 (-10) cm, the terminal one flexuous and often curving at apex; partial panicles staminate or pistillate, the staminate borne from proximal 1-5 nodes and the pistillate borne from distal 4-5 nodes; panicle axes appressed- to spreading-hispidulous, the branchlets ascending, often flexuose; spikelets unisexual, solitary or in fascicles of 2-5 from prophyllar nodes of branchlets, ellipsoid-obovoid, 2.5-3.5 × 1.3-1.8 mm, the pistillate spreading to 2 mm wide with maturing achene; scales ciliate on margins, puberulent distally, reddish brown; carina 1- to 3-nerved, prolonged beyond the obtuse, truncate, or subemarginate apex as a prickly mucro or short awn; staminate scales numerous, oblong, 2-2.5 × 0.7-1 mm; pistillate scales 6-7, only the terminal one fertile, lowermost 1-2 ovate, short-awned, uppermost 5 widely oblong-ovate, 1.8-2.2 × 1.3-1.8 mm, mucronate. Hypogynous

squamellae 3, minute, rounded-obdeltate, ca. 0.1 mm long or less, eciliate or sparsely ciliate, sometimes shortly bristle-tipped, reddish, adherent to base of achene. Stamens 1, the anthers 1-1.3 mm long, with a prickly apiculum. Achene bottle-shaped, terete or obscurely trigonous, 2.5-3 (-4) × 1.6-2 mm, sub-rounded at base, conical at apex with a truncate tip, smooth, minutely rugulose-papilliate, glabrous to sparsely puberulent, brown with a dark brown patch on each side.

General distribution: Central America, West Indies, and South America.

Distribution in Puerto Rico: Savanna-like swales. Dorado and Vega Baja. Known only from the vicinity of Laguna Tortuguero and Dorado.

Note: Puerto Rican plants belong to the more widely distributed typical subspecies, subsp. *guianensis*.

Selected specimens examined: PUERTO RICO: Dorado: *Sintenis 6845* (US). Manatí: Near rail road track from Manatí to Vega Baja, *Underwood & Griggs 946* (US). Vega Baja: Bo. Algarrobo, just S of Laguna Tortuguero, *Proctor 45652* (US).

11. LIPOCARPHA

Lipocarpha R. Br. in Tuckey, Narr. Exped. Zaire 4: 459. 1918, *nom. conserv.*

Annual or rarely perennial herbs, tufted. Culms rounded or broadly elliptical in cross section. Leaves crowded at base; sheaths short, closed; ligule absent; blades well-developed, flattened or inrolled. Inflorescence of 1-few clusters of ovoid or globose spikes, of many spirally arranged reduced 1-flowered spikelets, terminal or sometimes appearing lateral (pseudolateral), capitate; involucral bracts several, the lower well-developed and leaf-like, the upper smaller and resembling the spike bracts; spike bracts obovate to spathulate, often with an acute to acuminate apex; inflorescence prophylls present; spikelets with a single bisexual flower (plants hermaphroditic), densely spirally imbricated on a cylindrical axis; scales dorsally rounded or flattened, hyaline, sometimes notched at apex, often reduced or wanting, the margins free, sometimes enveloping the flower and at maturity the achene. Terminal flowers absent; hypogynous squamellae or bristles absent; stamens 1-3; style 2- or 3-branched, glabrous, the base not expanded. Fruit an achene, obovoid or ellipsoid-obovoid to narrowly subcylindrical, apiculate or entire, often with a constriction at base, minutely papillate or puncticulate, naked or sometimes enveloped or clasped by the fertile spikelet scale and falling together with it. Thirty-five species with its center of distribution in Africa. Also in the Americas, Madagascar, southeast Asia, Malesia, and Australia.

TYPE: *Lipocarpha senegalensis* (Lam.) T. Durand & H. Durand (= *Lipocarpha argentea* R. Br., *nom. illeg.*; ≡ *Hypaelyptum argenteum* Vahl, *nom. illeg.*; ≡ *Scirpus senegalensis* Lam.).

Reference: Goetghebeur, P. & A. Van den Borre. 1989. Studies in Cyperaceae 8. A revision of *Lipocarpha*, including *Hemicarpha* and *Rikliella*. Wagningen Agric. Univ. Pap. 89-1: 1-87.

1. Lipocarpha micrantha (Vahl) G. C. Tucker, J. Arnold Arbor. 68: 410. 1987; *Scirpus micranthus* Vahl, Enum. Pl. 2: 254. 1805; *Hemicarpha micrantha* (Vahl) Pax in Engler & Prantl, Nat. Pflanzenfam. 2, Abt. 2: 105. 1887. Type: French Guiana. *Richard s.n.* (holotype: C-Vahl; isotype: P).

Scirpus subsquarrosus Muhl., Descr. Gram. 39. 1817; *Hemicarpha subsquarrosa* (Muhl.) Nees in Martius, Fl. Bras. 2(1): 61. 1842. Type: United States; Pennsylvania. *Muhlenberg s.n.* (holotype: B-Willd. 1202).

Fig. 52. A-E

Tufted annual, 1-13 (-20) cm tall. Culms slender, spreading, often curved outwards, obtusely trigonous, finely ribbed, smooth, 0.3-0.5 mm wide. Leaves 2-3, basal; sheaths loose, 5-25 mm long, thinly herbaceous, finely veined with often reddish veins proximally, reddish brown or light brown, obliquely truncate at orifice, the inner band hyaline distally, splitting with age; blades lanceolate to narrowly linear, subinvolute, 1-20 × 0.2-0.5 mm, obtuse at apex. Inflorescence a small pseudolateral head of 1-3 spikes, 2-7 mm diam.; involucral bracts 1-2 (-3), the lowermost erect, culm-like, 0.5-5 cm long, the uppermost shorter, leaf-like, divergent to reflexed; spikes ovoid to

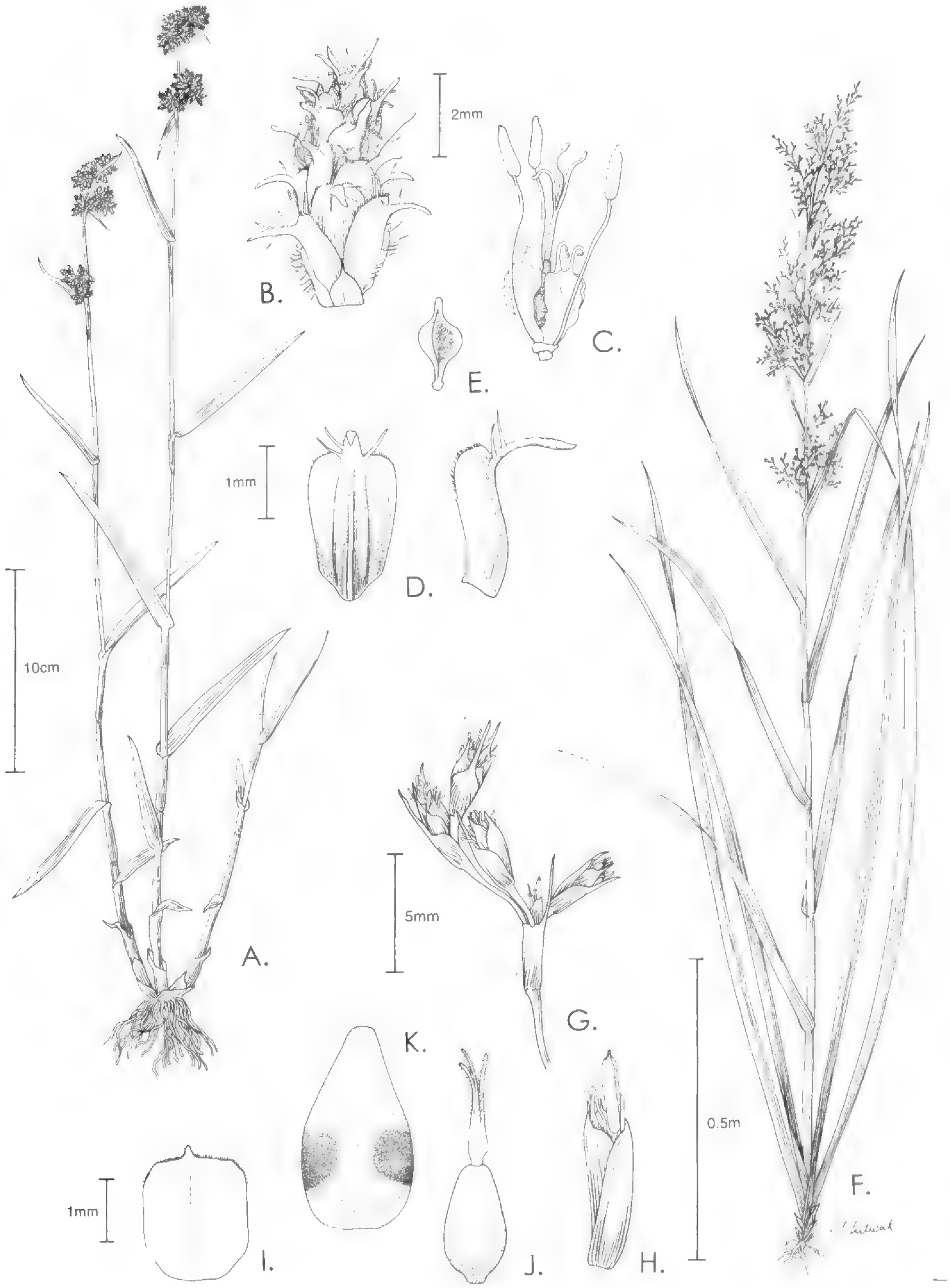


Fig. 51. A-E. *Fuirena umbellata*. **A.** Habit. **B.** Spikelet. **C.** Flower. **D.** Spikelet scale, dorsal view and lateral views. **E.** Achene. **F-K.** *Lagenocarpus guianensis*. **F.** Habit. **G.** Inflorescence branch. **H.** Spikelet. **I.** Spikelet scale. **J.** Pistil. **K.** Achene. (A-E, from *Proctor 48747*; F-G, from *Proctor 45602*; H-K, from *Proctor 39464*).

oblong-ovoid, 1-5 × 1.3-2.3 mm, obtuse to subacute, rounded to subtruncate at base, the rachis elongating and becoming denuded proximally with falling of mature achenes and bracts; spike bracts rhombic-obovate to obtrullate, cuneate at base, 0.5-1 (-1.3) × 0.3-0.4 mm, scaberulous distally, yellowish to red-brown or chestnut brown on sides, 2- to 3-nerved on each side, carina 3-nerved, greenish, converging at apex and forming an acute to acuminate tip; spikelet scale 1, oblanceolate, hyaline, often wanting. Stamens 1, the anthers elliptic, 0.2-0.3 mm long, blunt at apex; style 2-branched. Achene obscurely trigonous or subrounded, obovoid to oblong-obovoid, 0.5-0.8 × 3-4 mm, rounded at apex, short-apiculate, cuneate at base, yellowish or purplish brown, with a silvery cast at maturity, puncticulate.

General distribution: United States, Mexico, Central America, West Indies, South America, and tropical Africa.

Distribution in Puerto Rico: White sand savanna. Vega Baja. Known only from the vicinity of Laguna Tortuguero, collected by *Woodbury s.n.*, 12 Mar 1960 (UPR; photo at US).

Selected specimens examined: PUERTO RICO: Vega Baja: Laguna Tortuguero, *Woodbury s.n.* (UPR; photo at US).

12. MACHAERINA

Machaerina Vahl, Enum. Pl. 2: 238. 1805.

Large or medium-sized perennials; rhizomes hardened, woody, short or horizontally creeping, often emitting creeping, stout, scaly stolons, 0.5-2 cm thick; roots coarse. Culms central, solitary, compressed, lenticular to ancipital, frequently channeled along one edge distally, finely or sometimes coarsely ribbed, glabrous. Leaves numerous, 2-ranked, primarily basal, frequently 1-2 (-3) reduced cauline ones medially, the upper (3-) 5-11 basal ones bearing elongate blades, the lower with blades shorter than the sheaths or wanting; sheaths laterally folded, narrowed to summit with an indentation along margins at junction with blade, finely ribbed, septate-nodulose, essentially glabrous; ligule absent; blades unifacial, flattened to ancipital in cross section, linear to linear-falcate, curving to an acuminate tip, finely ribbed, green, glabrous, the margins entire. Inflorescence 1-3 remote to subcontiguous or contiguous, open or contracted, partial panicles; main axes and lateral branches of panicles frequently flexuose; bracts subtending panicles blade-bearing, the blades rarely exceeding length of subtending panicle, the uppermost ones often with an uncinate apex; spikelets numerous, in turbinate or spherical clusters or fascicles of 2-4 (-6), or sometimes solitary, laterally compressed, each subtended by a short or barely sheathing prophyllar bract, 2- to 7-flowered, with 0-4 basal scales empty, the scales distichous or sometimes nearly spirally arranged; scales laterally subcompressed, thin, boat-shaped, keeled, brown to brown-black, purple-black, or black, the margins frequently ciliate. Flowers bisexual; hypogynous bristles 6-3, subulate or flattened, antrorsely spinulose distally, or often undeveloped and represented only by very short rudiments at base; stamens 3, the anthers sagittate at base, the connective forming an acuminate, lanceolate-subulate appendage at apex; style 3-branched, the stigmatic branches minutely scaly or fimbrillate, ⅓ to ½ length of style. Achene with a 3-winged, stipitate base and persistent, triquetrous or 3-winged style base, the wings thin and chartaceous or incrassate, decurrent and often with a distinct wire-like margin between base of wing and achene body; achene body globose, obovoid, turbinate, or ellipsoid, often with a constriction (sometimes indistinct) just above the stipitate cellular-reticulate base, faintly rugose or rugulose, finely transversely rugulose or wrinkled, or essentially smooth, the pericarp very thin and brittle; style base triquetrous or 3-winged, triangular to triangular-lanceolate, the angles often whitened or blackened, crinkled and blistered, scabrous, or beset with crystalline fimbrillae or scales. Approximately 25 species (here excluding *Baumea* Gaudich.), Pantropical, many local or relictual: West Indies, South America, Africa, Asia, Malesia, and the Pacific Islands (including the Hawaiian Islands).

TYPE: *Machaerina restioides* (Sw.) Vahl (≡ *Schoenus restioides* Sw.).

Reference: Strong, M. T. 1997. *Machaerina* (Cyperaceae) in South America. Novon 7: 308-319.

1. Machaerina restioides (Sw.) Vahl, Enum. Pl. 2: 238. 1805; *Schoenus restioides* Sw., Prodr. 19. 1788; *Cladium restioides* (Sw.) Benth. ex C. B. Clarke in Urban, Symb. Antill. 2: 135. 1900. Type: Montserrat, *Ryan s.n.* (holotype: BM; isotypes: B-Willd. 1149, C).

Fig. 52. F-J

Rhizomatous perennial, (25-) 50-140 (-160) cm tall; rhizomes scaly, ca. 1 cm thick. Culms lenticular, 1.8-6 (-8) mm wide, sheathing bases 8-30 mm wide just above rootstock, widely spreading above. Leaves primarily basal, 1-2 cauline below inflorescence, 5-11, 2-ranked; sheaths elongate, light brown, tinged reddish to cinnamon-colored, essentially glabrous; blades unifacial, linear-falcate, stiffened, indistinctly septate-nodulose, (5-) 12-70 (-90) cm × (3-) 5-15 (-18) mm. Inflorescence a terminal and often 1-2 remote or subcontiguous, narrowly rhombic partial panicles from the upper leaf-like bracts, the terminal one largest, 6-17 × 1-4 cm; branches flexuose, bearing small turbinate clusters of (1-) 2-6 spikelets, 3-8 mm in diam.; spikelets ovate, 3.5-4.5 × 2-3 mm, with 2-5 florets; fertile scales 2-ranked, often obscurely so, ovate-elliptic or oblong-ovate to oblong-lanceolate, dorsally obtuse to subrounded, 2.5-3.2 × 1.3-1.7 mm, chartaceous, brown-black to dark purple-black or black, with dark reddish brown scarious margins proximally, dull to sublustrous, minutely antrorsely scabrous-hispid on sides distally, margins ciliate-scabrous, lateral veins indistinct, the carina prominent, antrorsely scabrous (at least distally), sometimes extending as a very short mucro at the acute to subobtuse apex. Stamens 3, the anthers 1-1.8 mm long. Achene 1.8-2.5 × 0.6-0.9 mm (including stipitate base); achene body ellipsoid-obovoid, ovoid-ellipsoid, or rounded-ovoid, with convex sides, indistinctly rugulose to nearly smooth medially or sometimes venose, with a distinct constriction just above the stipitate base, narrowly winged, brown, with pale wing-angles, the base triquetrous, cellular reticulate; style base triquetrous, triangular-lanceolate to linear-lanceolate, 0.3-0.8 × 0.3-0.4 mm, minutely antrorsely scabrous-hispid with crystalline prickles, pale at base, reddish distally; bristles 6, antrorsely spinulose distally or essentially smooth, variable in length, shorter than to 1 or 2 exceeding achene body, often caducous, rarely rudimentary.

General distribution: Endemic to the West Indies; Cuba, Hispaniola, Puerto Rico, and the Lesser Antilles.

Distribution in Puerto Rico: Known only from the summit of El Yunque in wet rocky places, 800-934 m, growing in rock crevices on cliffs or open grassy areas. Río Grande.

Common names: Puerto Rico: *Cortadora, Cortadera, Cortadora de altura, Lambedora.*

Selected specimens examined: PUERTO RICO: Río Grande: El Yunque, *Sargent 549* (US); *Woodbury s.n.* (US); top of El Yunque Mt., *González-Más 1521* (US); Sierra de Luquillo, *Hioram 366* (US); *Sintenis 1382* (US-2).

13. REMIREA

Remirea Aubl., Hist. Pl. Guiane 44, t. 16. 1775.

A monospecific genus represented by the species listed below. Pantropical.

TYPE: *Remirea maritima* Aubl.

Reference: Oteng-Yeboah, A.A. 1975. Morphology, anatomy and taxonomy of the genus *Remirea* Aublet (Cyperaceae). Boissiera 24a: 197-205.

1. Remirea maritima Aubl., Hist. Pl. Guiane 45. 1775. Type: French Guiana. *Aublet s.n.* (holotype: BM).

Remirea pedunculata R. Br., Prodr. 236. 1810; *Cyperus pedunculatus* (R. Br.) J. Kern, Acta Bot. Neerl. 7: 798. 1958; *Mariscus pedunculatus* (R. Br.) T. Koyama, Gard. Bull. Singapore 30: 157. 1977. Type: Australia; Queensland. *Brown s.n.* (holotype: BM).

Fig. 53. E-H

Rhizomatous perennial, 4-15 (-20) cm tall; rhizome long-creeping, branched, clothed with membranous, brownish sheaths and their fibrous

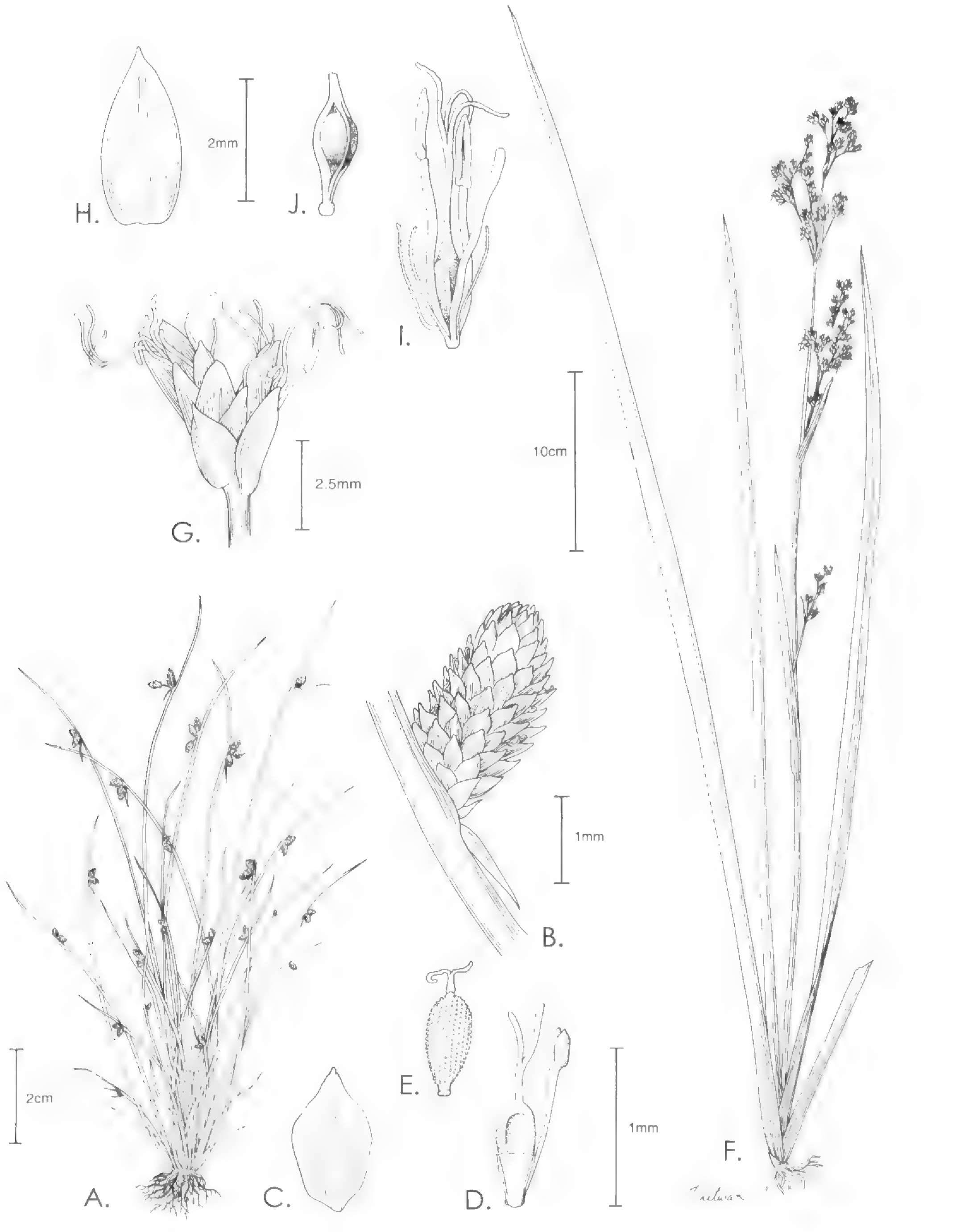


Fig. 52. A-E. *Lipocarpha micrantha.* **A.** Habit. **B.** Inflorescence spike. **C.** Spikelet scale. **D.** Flower. **E.** Achene. **F-J.** *Machaerina restioides.* **F.** Habit. **G.** Inflorescence branch. **H.** Spikelet scale. **I.** Flower. **J.** Achene. (A, from *Curtis 5240*; B-E, from *Kral 7570*; F, from *Sargent 549*; G-J, from *Hioram 366*).

remnants, rooting at the nodes, 1-3 mm thick. Culms solitary or loosely crowded at tips of rhizome, erect, ascending, or nearly prostrate, trigonous, rigid, smooth, 1-2.5 mm wide. Leaves numerous, primarily cauline, crowded from base to apex; sheaths short, basal ones fibrillose with age, light brown, the inner band membranous, reddish brown, truncate to U-shaped at orifice; ligule absent; blades 2-12 cm long, elongating to 20 cm in sterile individuals, 2-7 mm wide basally, linear-lanceolate, rigid, canaliculate, often recurved, antrorsely scabrous on margins and abaxial midcosta distally, coriaceous, glaucous-green, attenuate to a triquetrous apex, the tip pungent. Inflorescence a capitate group of (1-) 3-6 (-8) sessile short spikes at the summit of the culm, 1.2-2.5 cm diam.; involucral bracts 6-9, leaf-like but reduced, subreflexed, the lowermost to 8 cm long, overtopping the inflorescence; spikes ovoid or ellipsoid, 7-20 × 5-10 mm, obtuse to subrounded; spikelets densely crowded on rachilla, ovoid to ovoid-ellipsoid, 3.6-5 × 1.2-2 mm, acute at apex, obtuse at base, slightly compressed, 1-flowered, with a single sterile scale below, disarticulating above the scale-like prophyll and bracteole, falling as a whole, terminated by a vestigial "corky organ", strongly flattened, ca. 3 mm long; rachilla of the uppermost internode becoming thick and corky at maturity, enveloping the achene; fertile scale ovate to broadly ovate or ovate-elliptic, 3.5-4.5 × 1.5-2.5 mm, boat-shaped, dorsally obtuse, 3- to 5-veined on each side above the scarious margins, carina 3-nerved, ending at or slightly prolonged beyond the acute apex as a blunt mucro; sterile scale like the fertile, but slightly smaller. Flower bisexual; hypogynous squamellae or bristles absent; stamens 3, the anthers 1.6-2.2 mm long, with a short, conical, reddish apiculum; style 3-branched. Achene tightly enclosed in the upper corky internode of the rachilla, trigonous, ovoid-ellipsoid to ellipsoid or oblong-ovoid, 2-2.5 × 0.7-1 mm, slightly dorsally compressed, short-beaked, obtuse at base, estipitate, puncticulate, shiny, dark brown to grayish brown or blackish.

General distribution: Southern United States (Florida), Mexico, Central America, West Indies, South America, Africa, southern Asia, Malesia, Pacific Islands, and Australia.

Distribution in Puerto Rico: In coastal sands of beaches, dunes, strand vegetation, and pastures. Arecibo, Camuy, Carolina, Hatillo, Isabela, Loíza, and San Juan.

Common name: Puerto Rico: *Junco de playa.*

Selected specimens examined: PUERTO RICO: Arecibo: West of Arecibo, *Chase s.n.* (US). Camuy: *Sargent B16* (US). Loíza: *N.L. Britton et al. 5727* (US). San Juan: *Sintenis 1121* (US).

14. RHYNCHOSPORA

Rhynchospora Vahl, Enum. 2: 229. 1805 [as "*Rynchospora*"], *nom. et orth. conserv.*

Perennials or sometimes annuals, vegetatively diverse; roots fibrous. Culms caespitose or borne singly, trigonous or obscurely so, occasionally cylindrical, shallowly to deeply channeled along one side or margin (at least distally) with channel edges often antrorsely scabrous, essentially smooth, sometimes scabrous distally, glabrous or sometimes hirsute. Leaves basal or basal and cauline, rarely strictly cauline; sheaths green, light brown or reddish brown, sometimes whitened at base, inner band membranous on basal sheaths, often purple-dotted, splitting with age, often membranous only at orifice on cauline sheaths, the orifice truncate or concave, sometimes U-shaped, rarely convex; ligule absent or sometimes present, often a narrow band of thickened tissue or trichomes at adaxial junction of sheath and leaf blade; blades flattened, V-shaped, or folded, occasionally involute or crescentform-capillary, linear, filiform, or sometimes capillary, herbaceous or occasionally stiff, glabrous, hirsute, or occasionally scabrous or scabridulous distally, rarely papillose or transversely rugulose, the margins and abaxial midvein usually antrorsely scabrous, ciliate, or with setose hairs. Inflorescence terminal or both terminal and with a series of lateral partial panicles from the upper leaf-like bracts, paniculate, corymbose, racemose or congested and head-like; involucral bracts in capitate species sometimes whitened at base; branches cylindrical, 3-angled, crescentform, or subcompressed, finely ribbed, scabrous, ciliate or smooth on margins, the spikelets solitary or in fascicles at branch tips; spikelets ovoid, ellipsoid, lanceoloid, or fusiform, cylindrical or subcompressed, primarily 1- to several-flowered, the scales spreading with

maturing achenes; scales spirally imbricate, ovate to lanceolate, shallowly to deeply boat-shaped, often inrolled around flower, finely and indistinctly nerved on sides, with a single distinct or sometimes indistinct midcosta, light to dark brown or ferrugineous, sometimes whitish. Flowers bisexual above the (1-) 2-5 (-9) empty basal scales of spikelet, the terminal often staminate with a rudimentary ovary or reduced and empty; bristles (1-) 6 (-20), rudimentary, or absent, when present antrorsely or retrorsely barbed, sometimes smooth or plumose; stamens 1-3 (-12), the anthers linear, narrowly elliptic or oblong, often with minute crystalline papillae or lobes at base; styles subulate, 2-branched or undivided, often long-exserted beyond apex of subtending scale. Achene biconvex to subcylindrical, sometimes inrolled with winged or wavy margins, obovate, oblong-obovate or oblong-elliptic, deeply pitted, transversely rugulose or sometimes smooth, the expanded, usually triangular, or sometimes discoid style base, persistent at the summit. A genus of approximately 270 species with its greatest diversity in the Western Hemisphere, particularly warm-temperate North America and the Neotropics.

TYPE: *Rhynchospora alba* (L.) Vahl (≡ *Schoenus albus* L.), *typ. conserv.*

References: Gale, S. 1944. *Rhynchospora* section *Eurhynchospora* in Canada, the United States, and the West Indies. Rhodora 46: 89-134, 159-197, 207-249, 255-278. Guaglianone, R. 1979. Sobre *Rhynchospora rugosa* (Vahl) Gale (Cyperaceae) y algunas especies afines. Darwiniana 22: 255-311. Koyama, T. 1972. Cyperaceae-Rhynchosporeae and Cladieae. *In:* B. M. Maguire, The botany of the Guayana Highland-Part 9. Mem. New York Bot. Gard. 23: 23-89. Kükenthal, G. 1949-1951. Vorarbeiten zu einer Monographie der Rhynchosporideae. Bot. Jahrb. Syst. 74(3): 375-509. 1949, 75(1): 90-126. 1950, 75(2):127-195. 1950, 75(3): 273-314. 1951. Thomas, W. W. 1984. The systematics of *Rhynchospora* section *Dichromena*. Mem. New York Bot. Gard. 37: 1-116. Thomas, W.W. 1992. A synopsis of *Rhynchospora* (Cyperaceae) in Mesoamerica. Brittonia 44: 14-44.

Key to the species of *Rhynchospora*

1. Inflorescence a single capitate cluster of essentially sessile spikelets at the summit of the culm; involucral bracts subtending spikelets (3-) 4-8, appearing whorled, elongate, often whitened basally, uniformly green in *R. radicans* subsp. *microcephala*..... 2
   2. Involucral bracts uniformly green; spikelets 3-6 (-7) ..... 25. *R. radicans* subsp. *microcephala*
   2. Involucral bracts whitened basally, at least adaxially; spikelets 5-50..... 3
      3. Involucral bracts whitened at base adaxially only; rhizome lacking stolons; culms caespitose; anthers (1.7-) 2-3 mm long ..... 5. *R. ciliata*
      3. Involucral bracts whitened at base both adaxially and abaxially; rhizome producing slender, scaly stolons to 20 cm long; culms solitary or rarely 2 together; anthers 1-2 mm long ..... 6. *R. colorata*
1. Inflorescence paniculate, terminal only or a terminal and series of 1-7 lateral, remote to contiguous, congested or open, small or large, simple to compound partial panicles from the upper sheathing bracts, at least some branching evident or spikelets pedicellate; sheathing or involucral bracts subtending each panicle or partial panicle 1 (-2), green..... 4
   4. Large, robust, stout perennials; leaf blades (5-) 8-23 (-25) mm wide at their widest point; achene margins irregular, thickened with constrictions and protuberances; style base spongy-thickened with 2-lobed sagittate base, as wide as and as thick as or slightly wider and thicker than achene body at base with a longitudinal medial groove on both sides..... 5
      5. Adaxial surface of leaf blades dark green, smooth and glossy, the abaxial surface green, septate-nodulose; spikelets in globose clusters at branch tips ..... 14. *R. gigantea*
      5. Adaxial and abaxial surfaces of leaf blades green, semi-glossy, the abaxial surface not septate-nodulose; spikelets in hemispherical fascicles at branch tips ..... 8. *R. corymbosa*
   4. Small to medium-sized, slender perennials or annuals; leaf blades 0.2-8 (-10) mm wide at their widest point; achene margins entire or flaring at apex in one species; style base not spongy-thickened, brittle, at most shallowly lobed at base, often narrower and thinner than achene body with a plane surface on both sides..... 6

6. Well-developed leaves cauline, 8-40, closely set (at least medially) with short intervals between the nodes, those at base and lower cauline reduced to short-bladed or bladeless sheaths. 7
7. Achenes transversely rugulose or indistinctly so; fertile scales 0.8-1.5 mm wide; style base conic-subulate; bristles absent ..... 30. *R. uniflora*
7. Achenes cellular-cancellate with 11-20 longitudinal rows of cells; fertile scales 1.6-2.8 mm wide; style base triangular-lanceolate or oblong-lanceolate; bristles rudimentary or sometimes 1-2. 8
8. Inner band of leaf sheath pilose to wooly at orifice, the surface emuriculate; culms 1.8-4 mm wide; leaf blades 2-7 mm wide; achene 0.7-1 mm wide; style base triangular-lanceolate, shallowly 2-lobed at base ..... 16. *R. jamaicensis*
8. Inner band of leaf sheath short-pilose to glabrous distally, the surface muriculate at orifice; culms 0.8-2.3 mm wide; leaf blades 1.3-4 mm wide; achene 1-1.3 mm wide; style base oblong-lanceolate, mitriform ..... 24. *R. racemosa*

6. Well-developed leaves primarily basal, cauline leaves 1-5 (not including upper sheathing bracts subtending partial panicles or fascicles of inflorescence), remote, with long intervals between the nodes..... 9
9. Bristles absent at base of achene..... 10
10. Spikelets (8-) 9-13 (-14) mm long ..... 13. *R. filiformis*
10. Spikelets 1.5-8 (-9) mm long..... 11
11. Spikelet scales white or dingy white; rhizome producing slender stolons; on serpentine and limestone soils in secondary forest, often shaded habitats..... ..... 2. *R. berteroi*
11. Spikelet scales light brown, yellowish brown, reddish brown, ferrugineous or copper-colored; rhizomes (when present) estoloniferous; on red clay or sandy or peaty soils in savannas and grassy or marshy areas, often open habitats in full sun..... 12
12. Achene margins at apex flaring, prolonged into an ear-like projection on each side that is confluent with margins of the tounge-like style base..... ..... 29. *R. tenerrima*
12. Achene margins at apex not prolonged, rounded to broadly rounded or truncate..... 13
13. Spikelets 3.2-8 (-9) mm long; fertile spikelet scales numerous, 9-45 or more..... 14
14. Sheaths uniformly pilose; lower corymb branches of inflorescence panicle and spikelet pedicels often divergent or recurved at maturity, the spikelets often nodding; spikelets broadly ovoid to globose with obtuse or broadly acute apex..... 10. *R. divaricata*
14. Sheaths essentially glabrous or sometimes pubescent proximally; lower corymb branches and spikelet pedicels of inflorescence panicle ascending; spikelets ovoid to oblong-ovoid or ovoid-ellipsoid with acute apex..... 15
15. Fertile spikelet scales 2.1-3 mm long; achene 1-1.1 × 1 mm, lustrous, yellowish brown to golden brown, maturing to dark reddish brown or brown-black, the rugae often lighter in color; style base 0.2-0.6 mm long, 1 mm wide at base... 21. *R. nitens*
15. Fertile spikelet scales 3.2-6.2 mm long; achene 1.5-1.7 × 1.3-1.6 mm, brown, yellowish brown, or dark brown; style base 0.8-1.2 mm long, 1.2-1.4 mm wide at base..... 32. *R. velutina*

13. Spikelets 1.5-3.2 mm long; fertile spikelet scales 2-5..... 15

16. Style base short bulbiform, 0.1-0.2 mm long, 0.3-0.4 mm wide at base 23. *R. pusilla*
16. Style base depressed-trigonous or strap-like, 0.1-0.4 mm long, 0.5-1 mm wide at base..... 17
17. Style base emphatically depressed trigonous, oval-shaped from top view, not lobed, 0.1 (-0.2) mm long, often 0.1 mm long or less ..... 9. *R. depressirostris*
17. Style base forming 2 strap-like lobes that are decurrent on shoulders of achene body to about the middle, abruptly narrowing distally into a short triangular-lanceolate tip, 0.3-0.4 mm long ..... 7. *R. contracta*

9. Bristles present at base of achene..... 18
18. Bristles plumose for most of their length..... 19
19. Bristles ½ length of achene or shorter; inflorescence a single spikelet or small, lax, corymbiform panicle of 2-3 spikelets; spikelets subflattened-fusiform, 7-9.5 (-10) mm long; rachilla anfractuose-elongate, spirally zig-zag above sterile basal scales; spikelet scales 7-10 ..... 4. *R. breviseta*
19. Bristles equaling to shortly exceeding achene and style base; inflorescence a single terminal small contracted corymbiform panicle of numerous spikelets, rarely a second lateral one below; spikelets ovoid to ovoid-ellipsoid, (2.5-) 2.8-5 mm long; rachilla not anfractuose-elongate; spikelet scales 5-6..... 22. *R. plumosa*

18. Bristles antrorsely or retrorsely barbed, sometimes setose at very base..... 20
20. Bristles 10-12, retrorsely barbed ..... 1. *R. alba*
20. Bristles (1-) 3-6, antrorsely barbed..... 21
21. Spikelets tightly compacted in globose capitula at ray or branch tips; style base linear-lanceolate, 4-angled, often curved, 1.8-3.1 mm long, 0.2-0.4 (-0.6) mm wide at base..... 15. *R. holoschoenoides*
21. Spikelets in fascicles or solitary at branch tips; style base deltate, triangular, triangular-lanceolate, lance-attenuate, or depressed-conical, flattened or compressed, not angled nor curved, 0.2-1.6 (-2.3) mm long, 0.5-1 mm wide at base..... 22
22. Spikelets lanceoloid to fusiform, 8-12 mm long, long-acuminate at apex; achene surface finely cellular-cancellate; style base lance-attenuate with concave margins, 1.2-2.3 mm long..... 11. *R. domingensis*
22. Spikelets ovoid to broadly ovoid, ovoid-globose, ovoid-ellipsoid, ovoid-lanceoloid, or ellipsoid, 2-8 mm long, acute to acuminate at apex; achene surface transversely rugose or rugulose, or smooth; style base deltate, triangular, triangular-lanceolate, or depressed-conical, 0.5-1 (-1.6) mm long..... 23
23. Adaxial surface of leaf blades finely transversely rugulose; achene plano-convex or unequally biconvex; plant of serpentine soils (particularly in the Maricao region) ..... 17. *R. lindeniana*
23. Adaxial surface of leaf blades finely cellular-reticulate or essentially smooth; achene biconvex; plants of sandy soils or deposits, damp or wet peats, red laterite or red clay soils..... 24
24. Achene surface essentially smooth..... 25
25. Achenes brown with a light brown or yellowish brown tumid center; fertile scale 1, clawed at base; style base 0.5-0.7 mm wide at base..... 3. *R. brachychaeta*
25. Achenes dark brown to brownish black or blackish with an often red or yellowish circular patch medially; fertile scales 2-4, not clawed at base; style base 0.7-1 mm wide at base.... 26
26. Leaf blades 1-3 mm wide; achene obovate or suborbicular, dark brown to blackish with a yellowish brown to deep red circular patch medially; style base acute to short-acuminate at tip ..... 12. *R. fascicularis*

26. Leaf blades 0.2-1.3 (-2) mm wide; achene elliptic, dark brown to brownish black with a distinct or indistinct somewhat paler brown or reddish area medially; style base with a broad bill-like extension at tip ..... 32. *R. wrightiana*

24. Achene surface distinctly transversely rugulose or pitted-reticulate..... 27

27. Leaf blades 0.2-1 mm wide; spikelets few, in open corymbiform partial panicles on elongate filiform pedicels ..... 26. *R. rariflora*

27. Leaf blades (0.7-) 1-8 (-10) mm wide; spikelets in congested corymbiform partial panicles, fasciculate, short-pedicellate..... 28

28. Style base triangular-lanceolate, 1.2-1.6 mm long; bristles often 3 times as long as achene ..... 18. *R. marisculus*

28. Style base triangular, deltate, or depressed-conical, 0.2-1.1 mm long; bristles shorter than to equaling achene or at most 2 times as long as achene. 29

29. Spikelets 5.6-8 mm long, acuminate at apex; achene shortly attenuate at base to a 0.5 mm long glossy reddish brown stipe; stamens often marescent..... 21. *R. odorata*

29. Spikelets 2.5-4.7 (-5) mm long, acute at apex; achene not stipitate; stamens evanescent..... 30

30. Apex of fertile scales acuminate; bristles with crystalline trichomes at base..... ..... 28. *R. rugosa*

30. Apex of fertile scales obtuse to emarginate; bristles lacking trichomes at base... 31

31. Achenes thinly biconvex, obovate to widely depressed-obovate; style base deltate, essentially confluent with the slightly rimmed apex of achene..... ..... 19. *R. microcarpa*

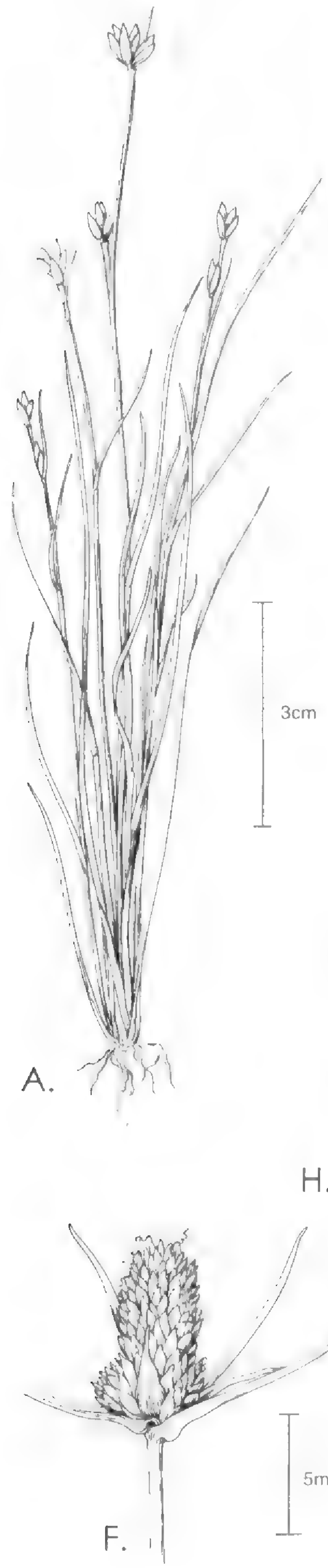
31. Achenes thickly biconvex, broadly obovate to subrounded; style base depressed-conical or subtriangular with a constriction between its base and apex of achene ..... 27. *R. recognita*

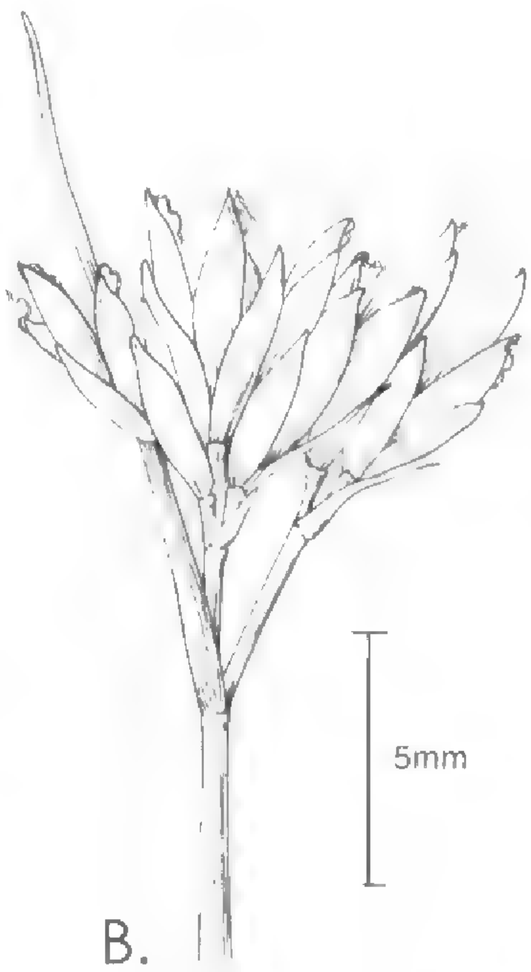
1. Rhynchospora alba (L.) Vahl, Enum. Pl. 2: 236. 1805; *Schoenus albus* L., Sp. Pl. 44. 1753. Lectotype: Europe. (LINN-68.17), designated by D. A. Simpson in Cafferty & C. E. Jarvis (eds.), Taxon 53: 179. 2004.

Rhynchospora luquillensis Britton, Bull. Torrey Bot. Club 50: 56. 1923. Type: Puerto Rico; Sierra de Luquillo. *Hioram 364* (holotype: NY!; isotypes: NY!, US!).

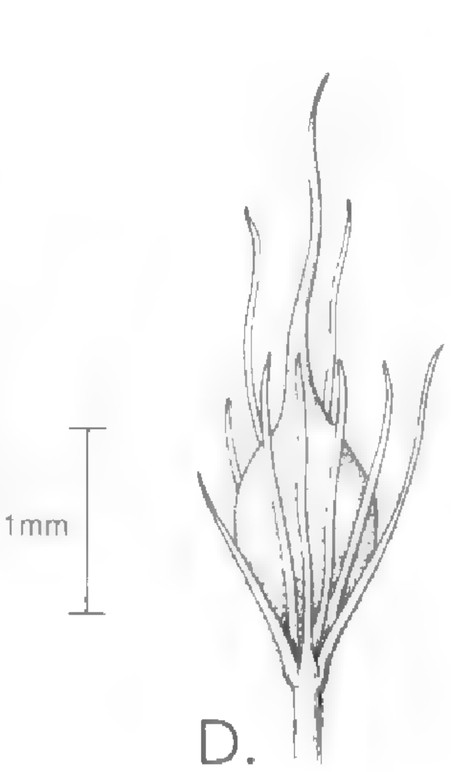
Fig. 53. A-D

Caespitose perennial, often forming dense tussocks, 6-70 (-80) cm tall; rhizome short, inconspicuous. Culms erect to ascending, 0.3-1.5 mm wide, triquetrous, firm but flexible, finely and coarsely ribbed, essentially smooth, green with larger ribs often pale green, glabrous, antrorsely scabrous on angles near apex. Leaves numerous, basal and cauline; sheaths short, herbaceous, finely veined, green to pale brown, glabrous; ligule a thickened narrow band of tissue at adaxial junction of sheath and blade; blades narrowly linear, 3-30 (-70) cm × 0.5-2.5 mm, flattened proximally, V-shaped proximally to subplicate distally, attenuate to triquetrous apex, finely veined abaxially, smooth adaxially with epidermal cells evident, margins and midvein beneath essentially smooth proximally, antrorsely scabrous distally, green, glabrous. Inflorescence a terminal and series of 1-2 lateral fascicles of spikelets from the upper sheathing bracts; fascicles turbinate, 7-16 × 4-23 mm, the smaller lateral fascicles on slender erect to ascending peduncles; spikelets ovoid-ellipsoid, 3.5-5 × 0.5-1.5 mm, acute to acuminate at apex, acute at base, with 4-5 (6) scales; fertile scales 2 (-3), ovate-elliptic to ovate-lanceolate, 2.5-4 × 1.4-2.6 mm, slightly curvate-keeled, dorsally obtuse or subrounded, submembranous, finely cellular-striate, semi-glossy, whitish to pale rufous, glabrous, margins broadly scarious, midcosta slender, extended beyond the acute apex as a short mucro. Stamens 2, the anthers 1.5-2 mm long, apiculate, rounded at base; style 2-branched. Achene biconvex, obpyriform, 1.6-1.8 (-2) × 0.9-1.2 mm, rounded to a truncate apex, attenuate to base, faintly transversely rugulose, yellowish









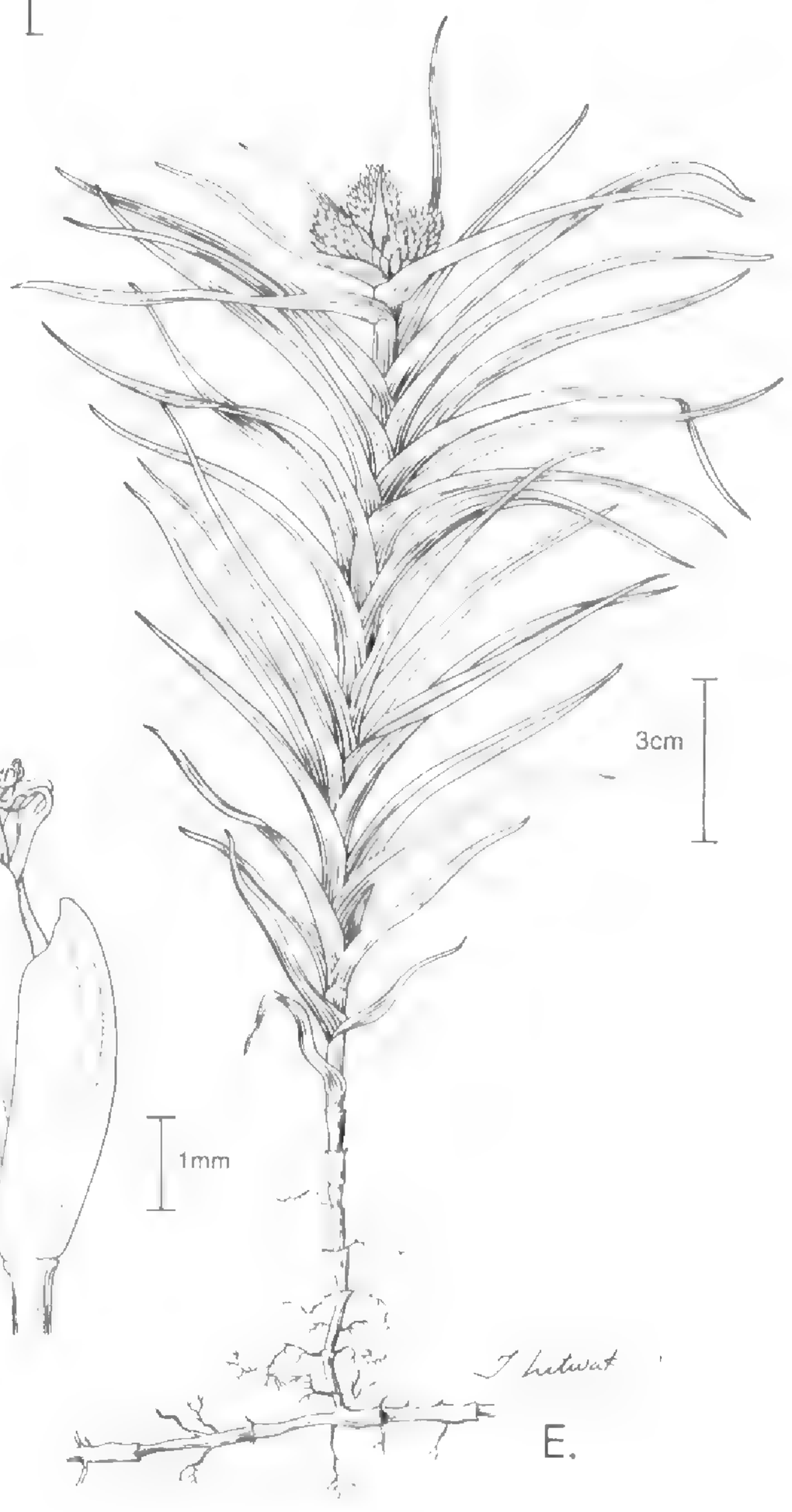




Fig. 53. A-D. *Rhynchospora alba.* **A.** Habit. **B.** Terminal inflorescence unit. **C.** Spikelet. **D.** Achene. **E-H.** *Remirea maritima.* **E.** Habit. **F.** Inflorescence. **G.** Spikelet. **H.** Achene. (A, from *Proctor 40815*; B-D, from *Sargent 583*; E, from *Sargent B16* and *Curtis 5385*; F-H, from *Chase s.n.*, 22 Nov 1913).

brown with a prominent pale medial disc and pale margins; style base triangular-lanceolate to lanceolate, 0.7-1.3 mm long, 0.3-0.5 mm wide at base, flattened, brittle, light brown, often reddish dotted or lineolate; bristles 10-12, flattened-subulate, stiff, retrorsely barbed, slightly villous at base, pale yellowish brown or reddish, exceeding the achene, shorter than to slightly exceeding apex of style base.

General distribution: Canada, United States, and the Greater Antilles.

Distribution in Puerto Rico: Grows on pockets of organic soil in exposed rock crevices and ledges on the summit of El Yunque, ca. 1100 m, in the Luquillo Mountains and along road to the summit of Cerro de Punta, in the Cordillera Central, 1200-1300 m. Naguabo, Ponce, and Río Grande.

Selected specimens examined: PUERTO RICO: Luquillo: Catalina-Yunque Trail, *N.L. Britton & Bruner 7626* (NY). Ponce: Toro Negro Forest Reserve, *Axelrod et al. 8874* (UPRRP). Luquillo: top of El Yunque Mt., *González-Más 1524* (NY, UPRRP); Luquillo Mts., El Yunque, *González-Más & Woodbury* 3455 (MAPR). Naguabo: Caribbean National Forest, *Axelrod & Grose 11223* (UPRRP); Sierra de Luquillo, *Proctor 40815* (US). Road to East Peak, *Woodbury s.n.* (NY). Río Grande: El Yunque, *Gleason & Cook X-86* (NY); El Yunque, *Sargent 583* (US).

2. Rhynchospora berteroi (Spreng.) C. B. Clarke in Urban, Symb. Antill. 2: 119. 1900; *Hypolytrum berteroi* Spreng., Neue Entd. 1: 241. 1820. Type: Guadeloupe. *Bertero s.n.* (holotype: TO; isotypes: M, MO).

Schoenus pusillus Sw., Prodr. 20. 1788; *Dichromena pusilla* (Sw.) Kunth, Enum. Pl. 2: 275. 1837; *Rhynchospora pusilla* (Sw.) Griseb., Abh. Königl. Ges. Wiss. Göttingen 7: 271. 1857, non Chapman ex M. A. Curtis, 1847. Type: Jamaica. *Swartz s.n.* (holotype: BM; isotype: M).

Kyllinga brevifolia Roem. & Schult., Mant. 2: 134. 1824, non Rottbøll, 1773. Type: Dominican Republic. *Bertero s.n.* (holotype: TO; isotypes: M, MO).

Scleria microdiscus Steud., Syn. Pl. Glumac. 2: 175. 1855. Type: Puerto Rico. *Herb. Wydler s.n.* (holotype: G).

Dichromena filiformis C. B. Clarke in Urban, Symb. Antill. 2: 102. 1900; *Rhynchospora subfiliformis* H. Pfeiff., Repert Spec. Nov. Regni Veg. 49: 80. 1940, as a new name for *Dichromena filiformis* C. B. Clarke, non *Rhynchospora filiformis* Vahl, 1805; *Rhynchospora nervosa* var. *subfiliformis* (H. Pfeiff.) Kük., Bot. Jahrb. Syst. 75: 295. 1951. Type: Hispaniola. *Poiteau s.n.* (holotype: G).

Stoloniferous perennial, 0.6-13 cm tall; stolons slender, 0.2-1 mm thick, stramineous to reddish brown; roots fine. Culms tenuous, erect to arching, 0.2-0.3 mm wide, obtusely triquetrous, delicate, finely ribbed, smooth, green, glabrous. Leaves 3-10 per culm, ascending to arching, basal and lower cauline; sheaths short, herbaceous, finely veined, pale green, glabrous to sparsely hirtellus; ligule absent; blades narrowly linear, (5-) 10-25 cm × (0.3-) 0.5-2 mm, flattened to subinvolute, attenuate to triquetrous tip, finely veined abaxially, finely cellular-reticulate-roughened adaxially, long pilose-ciliate along margins, antrorsely scabrous on margins and abaxial midvein (at least distally), green, glabrous or sometimes hirtellus or sparsely so adaxially or abaxially (at least proximally). Inflorescence a small fascicle of 2-6 congested spikelets at the summit of the culm; involucral bracts leaf-like but reduced, often with scarious margins proximally, ciliate-scabrous (at least distally), the lowermost equaling or slightly overtopping the inflorescence, to 20 mm long; fascicles 4-8 × 2-5 mm; spikelets ovoid, 2.5-5 × 0.8-1.8 mm, acute to obtuse at apex, cuneate to sub-rounded at base, the scales 6-8 (-10), spreading with maturing achenes; fertile scales 5-6 (-8), ovate to ovate-lanceolate, 2-3.2 × 1-1.8 mm, boat-shaped, dorsally obtuse to rounded, thinly herbaceous to submembranous, white to dingy white, margins scarious, entire, midcosta fine, indistinct proximally, light green distally, extending only slightly beyond acute apex as short mucro. Stamens 3, the anthers 0.6-1 mm long, with a dark triangular-papillate appendage at apex, sub-rounded and minutely papillate at base; style 2-branched. Achene biconvex, obovate to broadly obovate, or somewhat obpyriform, 0.9-1 × 0.8-0.9 (-1) mm, truncate to slightly arching at apex, subabruptly narrowed at base, transversely rugulose, stramineous to orangish brown, sometimes with dark brown to blackish brown

rugae; style base triangular to shallowly triangular, 0.2-0.6 mm long, 0.5-0.7 mm wide at base, with concave angles, subflattened to thickened, crustose, dull to semi-glossy, light brown to brown or blackish; bristles absent.

General distribution: Greater Antilles, Guadeloupe, and Belize.

Distribution in Puerto Rico and the Virgin Islands: On serpentine and limestone soils in often shaded, secondary forests; forested hillsides and slopes, banks, rocky areas, cliffs, ridges, and road banks at lower to middle elevations. Arecibo, Bayamón, Cabo Rojo, Dorado, Florida, Hatillo, Isabela, Lares, Maricao, Mayagüez, Rincón, Sabana Grande, San Germán, San Juan, San Sebastián, Toa Baja, Utuado, Vega Alta, and Vega Baja; St. Thomas.

Selected specimens examined: PUERTO RICO: Arecibo: Tanamá, Reserva Mata de Platano, *Ackerman 3414* (UPRRP); Río Abajo, *Liogier et al. 30827* (NY). Río Tanamá, *Stevens 7865* (NY). Bayamón: *Liogier 10200* (US). Isabela: Bo. Planas, Guajataca Forest, *Axelrod 7172* (UPRRP, US). Lares: *Stevens & Hess 4946* (NY). Maricao: Maricao Forest, *González-Más 1995* (MAPR). Mayagüez: Cerro Las Mesas, *N.L. Britton & Brown 3878* (NY, US); Guanajibo, near Mayagüez, *N.L. Britton et al. 4336* (NY, US). Rincón: Punta Higuero, *González-Más & Seda 2689* (MAPR).Sabana Grande: Susúa Forest Reserve, *González-Más 2030* (MAPR). San Juan: Martín Peña, *Stevenson 3726* (NY, US). San Sebastián: Cidial, *González-Más 928* (MAPR, NY). Utuado: *Stevens & Hess 4699* (NY). Vega Alta: Quebrada Arenas, *González-Más 1114* (MAPR, NY, US). Vega Baja: Rt. 644, ca. 1.5 mi. from Rt. 155, *Taylor 8859* (UPRRP).

3. Rhynchospora brachychaeta C. Wright in Sauvalle, Anales Acad. Ci. Méd. Habana 8: 85. 1871. Type: Cuba; Pinar del Río. *Wright 3782*, (holotype: GH; isotypes: NY!, US!).

Rhynchospora blauneri Britton, Bull. Torrey Bot. Club 50: 56. 1923. Type: Puerto Rico; Sierra de Luquillo. *Blauner 247* (holotype: NY!).

Rhizomatous perennial, 10-50 cm tall; rhizome short, creeping, the culms spaced at intervals along the rhizome. Culms ascending, 3-5 mm wide, filiform, obtusely trigonous to subterete, finely ribbed, firm, glabrous, green. Leaves 2-4 (per culm), primarily basal; sheaths elongate, finely ribbed, green, glabrous; ligule absent; blades linear-filiform, often capillary, 10-20 cm × 0.3-0.8 mm, involute proximally, crescentform-capillary to terete distally, antrorsely scabrous on margins distally, green, glabrous, attenuate to apex. Inflorescence a terminal and 1-3 small lateral partial obtriangular or narrowly elliptic panicles of fascicled spikelets from the upper sheathing bracts; panicles 6-10 × 4-10 mm; spikelets narrowly ovoid-lanceoloid, 3-3.2 × (0.6-) 0.7-1.2 mm, with acuminate apex, cuneate at base, 10-25 per partial panicle, with 3-4 scales; fertile scale ovate, 1, 2.1-3 × 1.9-2.2 mm, clawed at base, inrolled around flower and developing achene, reddish brown or brown, glabrous, with a single pale narrow midcosta prolonged beyond apex as a 0.2-0.3 mm long mucro, lateral veins indistinct, margins entire, inrolled in fertile scales, the apex acuminate. Stamens 3, or sometimes 1-2 abortive, the anthers 1.5-2 mm long; style 2-branched. Achene biconvex with bulging center, obovate, 1.2-1.4 × 1-1.1 mm, faintly cellular-reticulate and brownish on sides, the turgid center smooth, light brown to yellowish brown; style base triangular to narrowly triangular, 0.5-0.7 mm long, 0.5-0.7 mm wide at base, pale brown; bristles 1-4, short to rudimentary, antrorsely barbed.

General distribution: Southeastern United States (Alabama, Florida, and Mississippi), Belize, Nicaragua, Greater Antilles, and Guyana.

Distribution in Puerto Rico: known only from a single collection made in the Sierra de Luquillo Mountains by *Blauner* (247) in 1852-53.

4. Rhynchospora breviseta (Gale) Channell, Rhodora 58: 336. 1956. *Rhynchospora oligantha* var. *breviseta* Gale, Rhodora 46: 129. 1944. Type: United States; Florida. *Curtiss 5687* (holotype: GH; isotypes: NC, US!).

Rhynchospora oligantha sensu Kükenthal, Repert. Spec. Nov. Regni Veg. 23: 207. 1926, non A. Gray, 1835.

Caespitose perennial, 10-60 cm tall; rhizome short, firm or ligneous, somewhat bulbous, crown-like; roots fine; sheathing base to 1 mm wide. Culms erect or weakly ascending, 0.2-0.5 (-0.7) mm wide, obtusely trigonous, capillary, delicate, finely ribbed, essentially smooth, pale green,

glabrous. Leaves numerous, ascending, basal and lower cauline; sheaths short, herbaceous, finely veined, pale green, inner band yellowish brown at orifice, glabrous; ligule absent or sometimes merely a narrow thickened band of tissue at adaxial junction of sheath and blade; blades filiform-setaceous, 7-45 cm × 0.2-0.5 mm, shallowly canaliculate adaxially, long-attenuate with a constriction towards apex, subflattened above this with an acute to acuminate tip which is antrorsely scabrous on margins, finely veined, cellular-reticulate adaxially, smooth, green, glabrous. Inflorescence a single spikelet or small corymbiform panicle of 2-3 spikelets subtended at base by an elongated involucral bract appearing as a continuation of the culm, rarely a remote lateral partial panicle present, the branching often simple; spikelet pedicels flattened to flattened-trigonous, ciliate on margins; spikelets subflattened-fusiform, becoming turgid and torulose with developing achenes, 7-9.5 (-10) × (1.4-) 1.8-3 mm, acuminate at both apex and base, the rachis anfractuose-elongate, spirally zig-zag above sterile basal scales, with 7-10 scales; fertile scales 3-8, widely ovate-elliptic, 4.3-6 × 3-4 mm, curvate-keeled, dorsally obtuse to rounded, abruptly narrowed proximally to a claw-like base, thinly herbaceous, finely cellular-striate, dull to semi-glossy, cinnamon-brown, margins narrowly scarious, undulate, midcosta fine, pale green or yellowish green to brown distally, extended beyond narrowly acute apex as a short mucro. Stamens 3, the anthers typically 0.4-0.8 mm long, triangular-apiculate, truncate at base; style 2-branched. Achene biconvex, obovate, 1.8-2.2 × 1.3-1.7 mm, rounded at apex, cuneate at base, transversely rugulose with faint longitudinally striae, variable in color, light brown, dark brown, dark blue, bluish black, or charcoal black, often with a whitish or bluish powdery bloom; style base short-conic or depressed-conic, abruptly contracted at base, 0.3-0.5 mm long, 0.6-0.7 mm wide at base, subflattened above base, brown; bristles 6, plumose to apex or sometimes antrorsely barbed at tip, silvery brown, short, ½ length of achene or shorter.

General distribution: Southeastern United States and the Greater Antilles.

Distribution in Puerto Rico: High elevation montane rock outcrops and wet sands of coastal plain savanna. Known only from Luquillo Mountains (El Yunque and East Peaks) and Laguna Tortuguero and vicinity. Ceiba, Dorado, Manatí, Río Grande, and Vega Baja.

Selected specimens examined: Puerto Rico: Dorado: *Woodbury s.n.* (UPR). Luquillo: El Yunque, East Peak Road, *Woodbury* s.n. (NY, UPR). East Peak area, *Woodbury* s.n. (UPR). Manatí: Tortuguero, *Woodbury s.n.* (NY, UPR).

5. Rhynchospora ciliata (G. Mey.) Kük., Bot. Jahrb. Syst. 56 (Beibl. 125): 16. 1921; *Dichromena ciliata* Vahl, Enum. Pl. 2: 240. Oct.-Dec. 1805, *nom. illeg.*, non *Dichromena* [as '*Dichroma*'] *ciliatum* Pers., Apr.-Jun. 1805, *nom. illeg.*; *Schoenus ciliatus* G. Mey., Prim. Fl. Esseq. 23. 1818; *Rhynchospora vahliana* Griseb., Fl. Brit. W. I. 577. 1864, *nom. illeg.*; *Rhynchospora nervosa* var. *ciliata* (G. Mey.) Kük., Bot. Jahrb. Syst. 75: 295. 1951; *Rhynchospora nervosa* subsp. *ciliata* (G. Mey.) T. Koyama, Madroño 20: 254. 1970, non *Rhynchospora ciliaris* [as '*ciliata*'] (Michx.) Vahl, Enum. Pl. 2: 235. 1805. [Vahl's incorrect publication of *Rhynchospora ciliata*, based on *Schoenus ciliaris* Michx., should be interpreted as an orthographic variant]. Lectotype: Puerto Rico. *West s.n.* (C-Vahl), here designated.

Dichromena pura Nees in Martius, Fl. Bras. 2: 112. 1842; *Rhynchospora pura* (Nees) Griseb., Fl. Brit. W. I. 577. 1864. Type: St. Vincent. *Lindley s.n.* (holotype: CGE; isotype: NY).

Fig. 54. A-D; 65. H

Caespitose perennial, 10-50 (-73) cm tall; rhizomes short; roots medium-sized, to 1 mm thick. Culms ascending, (0.7-) 1-1.7 (-2) mm wide, obtusely trigonous or shallowly triquetrous, finely ribbed, often indistinctly so, green, glabrous distally, often hirsute proximally; sheathing base of culms and lower nodes 1-4 mm wide. Leaves 5-15 per culm, ascending, basal and lower cauline; sheaths short, loose, finely veined, light green to straw-colored, whitened at base, hirsute to glabrous; ligule absent; blades linear, 8-65 cm × 1.5-4.5 mm, flattened, often folded or margins subinvolute, acuminate at apex, finely and distinctly veined abaxially, essentially glabrous, green, finely cellular-reticulate roughened adaxially, glabrous or hirsute proximally, whitish

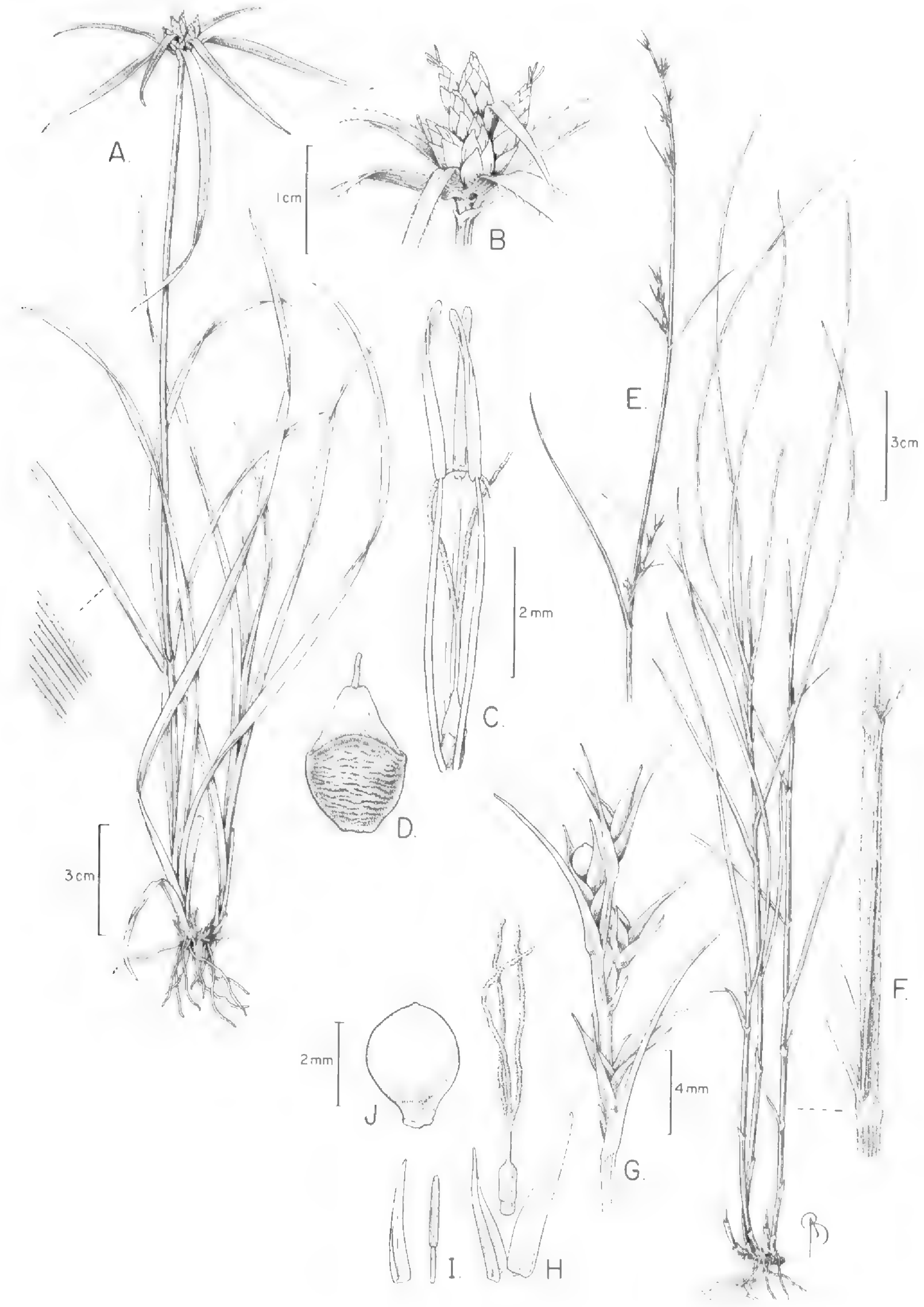


Fig. 54. A-D. *Rhynchospora ciliata.* **A.** Habit, and detail of abaxial side of leaf blade. **B.** Inflorescence. **C.** Flower. **D.** Achene. **E-J.** *Scleria lithosperma.* **E.** Habit. **F.** Detail of culm showing summit of sheaths with contraligules. **G.** Inflorescence branch. **H.** Pistillate scales and pistil. **I.** Stamen and staminate scale. **J.** Achene. From Acevedo-Rdgz., P. 1996, Flora of St. John, Mem. New York Bot. Gard. 78.

or pale green, margins and abaxial midvein antrorsely scabrous, long-ciliate proximally. Inflorescence a glomerate, hemispherical head of 5-16 spikelets at the summit of the culm, 10-17 (-20) mm in diam.; involucral bracts 7-8, leaf-like, longer than the inflorescence, white on adaxial surface basally, green and glabrous to hirsute abaxially at base, the margins ciliate proximally; spikelets ovate to widely-ovate, 5-10 × 2-4 mm, acute to narrowly acute at apex, rounded at base, with 10-35 scales; scales all fertile except for basal scale of spikelet, ovate, 3.5-5 × 2-3 mm, broadly boat-shaped, curvate, slightly keeled distally, dorsally obtuse to rounded, glabrous, whitish, frequently red-lineolate, midcosta narrow, pale, green distally, extending beyond the acute, obtuse, rounded or emarginate apex as a short, straight or recurved mucro. Stamens 3, the anthers (1.7-) 2-3 mm long, bluntly apiculate, truncate at base with minute crystalline lobes or papillae; style 2-branched. Achene biconvex, turgid, obovate to depressed-obovate, 1.3-1.8 × 1.1-1.6 mm, rounded to broadly rounded at apex forming a very fine rim around base of style, short-cuneate at base, transversely rugulose, shiny, stramineous to dark yellowish brown at maturity; style base triangular with concave margins that are shortly decurrent on shoulders of achene, 0.5-0.8 mm long, about as wide as the achene, rounded or obtuse at tip, whitish to light brown or brown at maturity; bristles absent.

General distribution: Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico and the Virgin Islands: In sandy or clayish soils; wet places, roadsides, grassy areas, lawns, fields, pastures, forest on serpentine, and dry coastal forests. Adjuntas, Aguas Buenas, Arecibo, Bayamón, Cabo Rojo, Caguas, Canóvanas, Carolina, Cayey, Comerío, Fajardo, Guayama, Guaynabo, Humacao, Isabela, Lares, Luquillo, Maricao, Mayagüez, Moca, Naguabo, Orocovis, Peñuelas, Río Grande, Sabana Grande, Salinas, San Germán, San Juan, San Lorenzo, San Sebastián, Trujillo Alto, Utuado, Vega Baja, Vieques, Yabucoa, and Yauco; St. John, St. Thomas, and Tortola.

Common names: Puerto Rico: *Botoncillo, Coquí blanco, Yerba de estrella.*

Note: In a revision of *Rhynchospora* section *Dichromena* by Thomas (1984), *R. ciliata* was treated as a subspecies of *Rhynchospora nervosa* (Vahl) Boeck. However, cytogenetic studies by Luceño et al. (Canad. J. Bot. 76: 440-449. 1998) indicate that *R. ciliata* should be treated as a distinct species from *R. nervosa.*

Selected specimens examined: Puerto Rico: Adjuntas: road 10, km 9, *González-Más 865* (NY, US). Aguas Buenas: Bo. Sumidero, *González-Más 1176* (MAPR, NY, US). Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10580* (US). Bayamón: *Johnston 1023* (US); *Underwood & Griggs 897* (NY, US). Cabo Rojo: Joyuda, *Hess 15* (MAPR). Canóvanas: Caribbean National Forest, La Condesa Section, *Axelrod et al. 1765* (UPRRP). Carolina: 204 St. Country Club, *Ortega 120* (UPRRP). Fajardo: S of Luquillo on Rt. 988, *Taylor 7706, 7709* (UPRRP). Guayama: Sierra de Cayey, Bo. Carite, *Ackerman 3468* (UPRRP). Guaynabo: Bo. Mamey, *Axelrod & Sastre 6106* (UPRRP). Isabela: Rt. 446, ca. 1-2 km N of boundary of Bosque Guajataca, *Taylor & Taylor 8926* (UPRRP). Luquillo: Road 988, Km 12.5, *Bisbal 1* (UPRRP). Maricao: Road 120, *González-Más 433* (MAPR); Maricao: Cordillera Central, S of Maricao on Rt. 120, *Grimes et al. 3254* (NY). Mayagüez: Las Mesas, *Holm 55* (US); *Holm 108* (MO). Moca: Road 110, km 9.2, *González-Más 1809* (MAPR). Naguabo: Bo. Florida, Road 191, km 27.5, *González-Más 1387* (MAPR); Sierra de Naguabo, Río Prieto and adjacent hills, *Shafer 3672* (NY, US). Orocovis: Bo. Barros, *Axelrod & Rogowitz 9989* (UPRRP). Peñuelas: Escuela Adolfo Grana, *Fraticelli 18* (MAPR). Río Grande: Along Rt. 186, bordering Carribean National Forest, *Kelloff et al. 364* (US). San Juan: Santurce, *Heller & Heller 11* (NY, US); Río Piedras, *Barrett 211* (MAPR, US). San Germán: *Sargent 488* (US). San Lorenzo-Yabucoa border, *Taylor 7603* (NY, UPRRP). San Sebastián: Bo Cidral, Road 111, *González-Más 910* (MAPR). Trujillo Alto: road 172, *González-Más 1562* (NY). Utuado: Road from Utuado to Lares, *Underwood & Griggs 86* (NY, US). Vieques: Isabel Segunda to Santa Maria, *Shafer 2611* (NY, US). Yabucoa: Sierra de Yabucoa, *N.L. Britton et al. 6248* (NY). Yauco: Bo. Susua Alta, Bosque Estatal de Susúa, *García & Caminero 3310* (MAPR). St. John: Bordeaux, *N.L. Britton & Shafer 562* (US); Lameshur, *Woodbury 226/6693* (VINPS). St. Thomas: Crown, *N.L. Britton & Marble 1346* (US); *Raunkiaer s.n.* (US); *Eggers 369* (NA).

6. Rhynchospora colorata (L.) H. Pfeiff., Repert. Spec. Nov. Regni Veg. 38: 89. 1935; *Schoenus coloratus* L., Sp. Pl. 43. 1753; *Schoenus stellatus* Lam., Encycl. 1: 741. 1784, *nom. illeg.*; *Dichroma ciliatum* Pers., Syn. Pl. 1: 58. 1805, *nom. illeg.*; *Rhynchospora stellata* Griseb., Abh. Koenigl. Ges. Wiss. Göttingen 8: 271. 1857; *Dichromena colorata* (L.) Hitchc., Rep. (Annual) Missouri Bot. Gard. 4: 141. 1893. Lectotype: Jamaica. Sloane, *Voy, Jamaica 1: t. 78, f. 1. 1707*, designated by W.W. Thomas, Mem. New York Bot. Gard. 37: 83. 1984.

Dichromena leucocephala Michx., Fl. Bor.-Amer. 1:37. 1803; *Rhynchospora leucocephala* (Michx.) Boeck., Vidensk. Meddel. Dansk Naturhist. Føren. Kjøbenhavn ser. 3, 1: 144. 1869. Type: United States; Carolina and Georgia. *Bosc s.n.* (holotype: P; isotype: G).

Rhizomatous perennial, (9-) 15-76 cm tall; rhizomes producing slender, scaly stolons up to 20 cm long, 1-2 mm thick; roots medium-sized, to 1 mm thick; sheathing base of culm 3-6 mm wide. Culms solitary, erect, obtusely trigonous proximally to obtusely triquetrous distally, 0.7-2 mm wide, very firm but flexuous, finely ribbed, smooth, pale green, glabrous. Leaves 3-11, ascending, basal and lower cauline; sheaths short, herbaceous, finely veined, pale green, glabrous; ligule absent; blades linear, 3-56 (-60) cm × (0.5-) 1-4 mm, flattened to margins incurved, attenuate to triquetrous apex, finely veined abaxially, very finely cellular-reticulate and essentially smooth adaxially, veins not evident, margins and abaxial midvein essentially smooth proximally, antrorsely scabrous distally, green to yellowish green, glabrous. Inflorescence a congested hemispherical to globose head of (5-) 10-50 spikelets at the summit of the culm; involucral bracts (3-) 4-7 (-8), linear, exceeding inflorescence head, green distally, white both adaxially and abaxially basally, the lowermost to 20 cm long; head 7-16 (-18) mm in diam.; spikelets ovoid to ovoid-ellipsoid, (3-) 5-9 × 1.5-2.5 mm, acute to obtuse at apex, cuneate to sub-rounded at base, with 7-30 scales; scales all fertile except for basal scale of spikelet, ovate to oblong-ovate, (2.5-) 3-4.5 × 2-4 mm, boat-shaped, dorsally acute to more commonly obtuse or rounded, thinly herbaceous, dull, white to dingy white, reddish lineolate proximally, glabrous, margins entire or narrowly scarious, midcosta indistinct, evident only at tip, not prolonged beyond acute to obtuse apex. Stamens 3, the anthers 1-2 mm long, apiculate, truncate at base with crystalline papillae; style 2-branched. Achene biconvex, obovate to widely obovate, 0.9-1.2 (-1.5) × 0.9-1.4 mm, truncate to slightly arched at apex, rounded at base, transversely rugulose, often with an indistinct cellular-reticulate margin, glistening, stramineous to dark brown or dark brown; style base triangular to shallowly triangular, 0.3-0.7 mm long, 0.8-1.2 mm wide at base, broadly and shortly attenuate to obtuse apex, subflattened, crustose, whitish to grayish brown or brown; bristles absent.

General distribution: Southeastern United States west to Texas, Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico: Wet to moist sandy soils of open marshlands, swampy areas, moist swales, pastures, drainage canals, open savannas, sandy thickets, second-growth coastal forest, and roadside ditches. Aguada, Añasco, Arecibo, Cataño, Dorado, Guánica, Guayama, Humacao, Luquillo, Manatí, Ponce, Río Grande, Toa Baja, Utuado, and Vega Baja.

Selected specimens examined: Puerto Rico: Añasco: *Sargent 639* (US). Arecibo: Río Abajo Forest Reserve, *Axelrod et al. 10923* (UPRRP). Cataño: *Millspaugh 152* (NY). Guánica: Guánica Lake, *Sargent 38* (US). Guayama: Algarrobo, *Stevenson 2128* (US). Luquillo: Bo. Mata de Platano, *Axelrod & Pérez 6569* (UPRRP). Manatí: Bo. Tierras Nuevas Saliente, *Axelrod & Sastre 6467* (UPRRP, US). Río Grande: Río Espíritu Santo, Coco Beach, *Liogier et al. 33789* (NY); Punta Comején, *Liogier et al. 29203* (NY). Toa Baja: Bo. Sabana Seca, Road 165, Km 16, *Meléndez & Moya 83* (UPRRP). Vega Baja: at the E end of Laguna Tortuguero along Rd. 687, *Taylor 7647* (NY, UPRRP).

7. Rhynchospora contracta (Nees) J. Raynal, Adansonia Ser. 2. 17: 277. 1978; *Haloschoenus contractus* Nees in Martius, Fl. Bras. 2(1): 123. 1842; *Dichromena contracta* (Nees) Steud., Syn. Pl. Glumac. 2: 136. 1855; *Rhynchospora micrantha* var. *contracta* (Nees) Kük., Bot. Jahrb. Syst. 75: 276. 1951. Type: Brazil; Piauí. *Martius s.n.* (holotype: M).

Juncus parviflorus Poir. in Lamarck, Encycl. Suppl. 3: 160. 1813, non Ehrhart, 1791. Type: Puerto Rico. *Ledrú 11* (holotype: P; isotype: P-2).

Scleria micrantha Poir. in Lamarck, Encycl. Suppl. 5: 108. 1817. Type: Puerto Rico. *Ledrú s.n.* (holotype: P).

Rhynchospora micrantha sensu C. B. Clarke in Urb., Symb. Antill. 2: 117. 1900, non Vahl, 1805.

Caespitose annual, 4.5-45 cm tall. Culms ascending, 0.4-0.8 mm wide, triquetrous to compressed-trigonous, soft, finely ribbed, smooth, green, glabrous. Leaves numerous, basal and cauline, the upper cauline ones representing leaf-like bracts subtending inflorescence corymbs; sheaths short, inflated, finely veined, green to pale green, glabrous; ligule absent; blades ascending, narrowly linear, flattened, (2-) 3-25 cm × (0.4-) 0.5-2.2 mm, green, glabrous, finely veined, veins scarcely evident adaxially, distinct abaxially and pale green, margins antrorsely scabrous distally, smooth proximally, midvein antrorsely scabrous distally on abaxial side. Inflorescence a terminal and series of 2-5 lateral compound corymbs with ascending to divergent or reflexed branches from the upper sheathing bracts; terminal corymb widely ovoid to depressed-ovoid, 8-60 × 11-75 mm, lateral corymbs in same size range as terminal except for the lowermost one which is often reduced; spikelets small, ovate-elliptic with acute apex, 1.5-2 × 0.5-0.7 mm, the scales 5-8, widely spreading with developing achenes; fertile scales 4-5, 1-1.3 × 0.6-1.2 mm, ovate to widely ovate, dorsally obtuse to rounded on mature scales, acute on immature scales, submembranous, subtranslucent, brown with minute reddish lineations, acute to subacuminate at apex, midcosta fine, antrorsely scabrous distally, pale brown, extending as a short mucro below scale apex, not prolonged beyond apex. Stamens 2, the anthers small, oblong-elliptic, 0.3-0.5 mm long; style 2-branched. Achene broadly biconvex to nearly rounded in cross section, 0.8-1 × 0.9-1 mm, depressed-obovate, broadly rounded at apex, sub-rounded at base with short stipitate cellular reticulate base, surface rugose, stramineous or light brown to blackish brown at maturity, margins costate; style base compressed proximally, as wide as achene body, forming 2 strap-like lobes that are decurrent on shoulders of achene body to about the middle, abruptly narrowing distally into a short triangular-lanceolate tip, 0.3-0.4 mm long; bristles absent.

General distribution: Mexico, Central America, West Indies, tropical South America, and tropical Africa.

Distribution in Puerto Rico: On red clay or sandy soils in moist to wet or sometimes dry habitats, marshy areas, clearings, grassy areas, seepage bogs, gravelly areas, dry scrub forest, and along trails. Bayamón, Dorado, Humacao, Lares, Luquillo, Mayagüez, Moca, Maricao, Naguabo, San Juan, and Yabucoa.

Selected specimens examined: PUERTO RICO: Bayamón: *Sintenis 1211* (US). Dorado: *Johnston 887* (NY). Humacao: Bo. Candelero Abajo, vicinity of Palmas del Mar, *Proctor & Rivera 46705* (US). Lares: *Sargent 3258* (US). Luquillo: Bo. Pitahaya, *Otero 524* (MO). Maricao: Bo. Indiera Fría, mountain ridge E of Río Postrero, *Proctor et al. 45213* (US). Mayagüez: *Sintenis 107* (US); Guanajibo, near Mayagüez, *N.L. Britton & Cowell 4077* (MO, NY). Moca: Rt. 110, km 10.8, *González-Más 1790* (MAPR, NY). Naguabo: Sierra de Naguabo, Loma Icaco, *Shafer* 3399 (NY, US). San Juan: Río Piedras, *Stevenson 1218* (US). Yabucoa: in arenosis ad Punta del Naranjo, *Sintenis 5301* (MO, NY, US).

8. Rhynchospora corymbosa (L.) Britton, Trans. New York Acad. Sci. 11: 84. 1892; *Scirpus corymbosus* L., Cent. Pl. 2: 7. 1756. Lectotype: India. Collector unknown. (LINN-71.48), designated by Gordon-Gray, Strelitzia 2 : 150. 1995.

Rhynchospora aurea Vahl, Enum. Pl. 2: 229. 1805. Type: India. *Koenig s.n.* (holotype: C-Vahl).

Robust, coarse, rhizomatous perennial, 60-200 cm tall; rhizome short, stout, hardened. Culm ascending, 2-8 (-11) mm wide, trigonous with plane sides to triquetrous, hardened and stiff, finely ribbed, finely antrorsely scabrous, with subappressed barbs on marginal ribs, pale green to green, glabrous, the edges of the channel antrorsely scabrous. Leaves 5-15 per culm (not including upper leaf-like bracts subtending inflorescence corymbs), arched-ascending, spreading, basal and cauline; sheaths elongate, inflated distally, often spongy-thickened on basal

leaves, herbaceous, substiffened, finely veined, antrorsely scabrous along margins on cauline sheaths, smooth on basal sheaths, pale green or sometimes tinged with brown, glabrous; ligule absent; blades linear, 40-190 cm × 8-23 mm, 1-costate, herbaceous to substiffened, finely many-veined, essentially smooth, green, glabrous, margins and midvein beneath antrorsely scabrous, the apex long-acuminate, triquetrous. Inflorescence a terminal and a series of 2-5 corymbose lateral partial panicles from the upper sheathing bracts; terminal corymb depressed obovoid, generally wider than long, 6-21 × 7.5-17.5 cm, generally the largest, the others gradually reduced below; spikelets many, in hemispherical fascicles at branch tips, ovoid-ellipsoid or ellipsoid, (4.5-) 5-7 (-7.5) × (1-) 1.2-2 mm, acute to acuminate at both base and apex, with 5-8 scales; fertile scales 2-3, ovate-elliptic to widely ovate-elliptic or linear-elliptic (terminal scale), 4-5.6 × 1.8-3.8 mm, thin, submembranous, dorsally obtuse to rounded at maturity, upper sterile and lower fertile scales inrolled at anthesis, finely cellular-striate, uniformly reddish brown with very fine red lineations, glabrous, margins narrowly scarious, midcosta fine, pale brown to brown, extending beyond the acute to acuminate apex as a short mucro on proximal spikelet scales, antrorsely scabrous distally near tip; Stamens 3, the anthers 2.3-3.5 mm long; style entire to shortly bi-lobed at tip. Achene biconvex, obtrullate or obovate, 2.3-3.3 × 1.7-2 mm, transversely rugulose, papillate, brown to dark brown, dull, cuneate to base, subacute at apex, the margins thickened with constrictions and protuberances; style base slightly wider and thicker than achene body, triangular with acuminate apex and 2-lobed sagittate base, 3-4.3 mm long, 1.7-2.1 mm wide at base, finely antrorsely scabrous (at least distally) spongy-thickened, brown, semi-glossy, with longitudinal medial groove on both sides that is often whitish at bottom of declivity; bristles 6, fine, subulate, up to 5 mm long, typically exceeding achene body and 2/3 length of style base, but sometimes 1-2 shorter than achene body, reddish, finely antrorsely barbed with blackish barbs.

General distribution: Pantropical.

Distribution in Puerto Rico: In wet swampy and marshy grounds or pastures at both low and high elevations. Arecibo, Bayamón, Cidra, Dorado, Mayagüez, Naguabo, San Juan, Toa Baja, and Utuado.

Common name: Puerto Rico: *Junco pico.*

Selected specimens examined: PUERTO RICO: Arecibo; Bosque de Río Abajo, Los Puercos, *Acevedo-Rdgz. 155* (SJ); Río Abajo, *Liogier et al. 30823* (NY). Bayamón: Bo. Sabana Seca, *Otero 537* (MO); *Sintenis 1241* (US); Bayamón to Cataño, *N.L. Britton et al. 2901* (US). Cidra: along railroad near Pueblo Viejo, *Heller 6398* (MO, NY, US); Dorado: Bo. San Antonio, *González-Más* 350 (MAPR). Mayagüez: *Stevens 713* (MAPR, NY). Naguabo: Bo. Río Blanco, *Axelrod & Thomas 11022* (UPRRP). *Stevenson* 2094 (NY). San Juan: Río Piedras, *Stevenson 1290* (US). Toa Baja: road 866, km 7.2 to Punta Salinas, *González-Más 1145* (MAPR, NY). Utuado: *Sargent 3275* (US).

9. Rhynchospora depressirostris M.T. Strong, Brittonia 52: 241. 2000. Type: Puerto Rico; Dorado. *Stevenson 889* (holotype: US!; isotypes: NY!, UPR!).

Rhynchospora tenuis sensu Britton & P. Wilson, Bot. Porto Rico 5: 102. 1923, non Willdenow ex Link, 1820.

Fig. 55. A-E

Rhizomatous perennial, 20-42 cm tall; rhizome short, the culms and numerous basal leaves forming dense clumps. Culms ascending, 0.4-0.9 mm wide, obtusely trigonous to compressed-trigonous or subterete, soft, flexuous, finely ribbed, pale green, glabrous. Leaves ascending, numerous, primarily basal, 1-3 cauline; sheaths quite long, particularly cauline ones, closely clasping culm, herbaceous, finely ribbed, pale brown to stramineous proximally, glabrous; ligule essentially absent, but sometimes a faint rim of tissue present at adaxial junction of sheath and blade; blades narrowly linear, 6-40 cm × 0.3-1.1 mm (unfolded), V-shaped to subfolded or sometimes involute, firm, herbaceous, finely veined abaxially, smooth, glossy, and minutely cellular-reticulate adaxially, light green or pale brown abaxially, green adaxially, glabrous, margins smooth proximally, antrorsely scabrous distally, the apex long-acuminate, triquetrous near tip. Inflorescence 1-3 (4) corymbose partial panicles from the upper sheathing bracts, panicles somewhat strict, the terminal panicle 2-7 × 1-1.7 cm, with 10-50 spikelets; sheathing bracts shorter and a little narrower than leaf blades, to 20 cm long; spikelets ovoid-ellipsoid, 2.5-3.2 × 0.6-1

mm, narrowly acute to acuminate at apex, becoming falcate with age, the scales 5-7, spreading with maturing achenes; fertile scales 3-4, ovate-elliptic or widely ovate-elliptic to ovate-lanceolate, 1.6-2.7 × 0.9-1.4 mm, dorsally obtuse to rounded, herbaceous, distal scales of spikelet thinly herbaceous to submembranous, minutely cellular-striate, semi-glossy, reddish brown with slightly darker brown lineations, glabrous, margins narrowly scarious, slightly crisped, midcosta very fine, indistinct except at apex, prolonged beyond narrowly acute to acuminate apex as a short mucro, lateral nerves indistinct. Stamens 3, the anthers 0.8-1.2 mm long, minutely lobed at base, glandular-apiculate; style 2-branched. Achene biconvex, rounded-obovate, 0.7-0.9 × 0.8-1 mm, slightly narrowed to truncate or sub-rounded at short stipitate base, truncate at apex, transversely rugose, narrowly cellular-reticulate along margins and at base, shining, glossy, red to reddish brown or brown; style base extremely depressed-trigonous, oval-shaped from top view, not lobed, to 0.2 mm long, often 0.1 mm long or less, 0.5-0.7 mm wide at base, brittle, dark brown or blackish; bristles absent.

General distribution: Endemic to Puerto Rico.

Distribution in Puerto Rico: White silica sand areas in the vicinity of Laguna Tortuguero and Dorado and at Punta Guayanes; Cataño, Dorado, Vega Baja, and Yabucoa.

Note: Rhynchospora depressirostris is closely related to *R. tenuis* Link and has been treated as that species by Britton & P. Wilson (1923), González-Más (1964), and Liogier & Martorell (1982: 220; 2000: 245). However, it consistently differs from the latter species in the style base and achene morphology. The type of *R. tenuis* Link is a plant from South America and has a style base that is shallowly triangular, 0.2-0.6 mm long, and 2-lobed at base, the lobes decurrent on shoulders of achene; and the achene is obovate and has a surface that is finely rugose or rugulose with 6-8 rugae per face. In *R. depressirostris,* the style base is extremely depressed-trigonous, 0.1 (-0.2) mm long, with an oval-shaped (from top view), unlobed base that is not decurrent on shoulders of achene; and the achene is rounded-obovate to depressed-obovate and has a rugose surface (more coarsely wrinkled than *R. tenuis*) with only 3-4 (-5) coarse rugae per face.

Selected specimens examined: Puerto Rico: Cataño: Bo. Palmas, *Axelrod & Díaz 12728* (UPRRP). Dorado: wet sand, 11 Jan 1964, *Woodbury s.n.* (UPR); Dorado, 1 Nov 1964, *Woodbury s.n.* (NY); Vega Baja: Tortuguero, 12 Mar 1960, *Woodbury s.n.* (NY, UPR); Tortuguero, May 1960, *Woodbury s.n.* (NY, UPR); Tortuguero, Sep 1960, *Woodbury s.n.* (UPR); Tortuguero lagoon, Vega Baja, 3 Mar 1963, *Woodbury s.n.* (UPR); Tortuguero, Sep 1968, *Woodbury s.n.* (NY, UPR, US); Tortuguero area, in savanna at sea level, *Liogier et al. 33611* (UPR); SE shore of Laguna Tortuguero off rte. 687, *Bradley et al. 22111* (GMUF); Tortuguero, *Woodbury s.n.* (NY, UPR, US). Yabocoa: Guayanes, May 1970, *Woodbury s.n.* (NY, UPR);

10. Rhynchospora divaricata (Ham.) M. T. Strong, comb. nov. - *Fimbristylis divaricata* Ham., Prodr. 14. 1825. Type: Puerto Rico. *Ledrú s.n.* (holotype: P-Desv.!).

Fimbristylis hirsuta Hochst. ex Steud., Syn. Pl. Glumac. 2: 116. 1855. Type: Surinam, *Hostmann 1127* (holotype: P; isotypes: BM-2!, G-2!, MO!, P).

Rhynchospora trichodes C. B. Clarke in Urban, Symb. Antill. 2: 116. 1900. *Schoenus hispidulus* Vahl, Enum. Pl. 2: 219. 1805. *Dichromena hispidula* (Vahl) Kunth, Enum. Pl. 2: 279. 1837. *Haloschoenus hispidulus* (Vahl) Nees in Martius, Fl. Bras. 2(1): 124. 1842. *Rhynchospora hispidula* (Vahl) Boeck., Linnaea 37: 604. 1873, non Grisebach, 1866. Type: French Guiana, *coll. ign.* (holotype: B, destroyed, photo US ex B).

Caespitose annual, 10-50 cm tall. Culms ascending,(0.5-) 0.6-3 mm wide, trigonous or subtriquetrous, often with obtuse angles, somewhat firm, flexible, longitudinally channeled along one side medially, finely ribbed, green, pilose. Leaves 3-6, ascending, basal and cauline, 12-40 cm long; sheaths eligulate, subinflated, loosely surrounding culms, finely veined, coarsely pilose to subglabrate, inner band membranous on proximal sheaths, only the orifice membranous on distal sheaths, the orifice concave, long-pilose on margin; blades flattened or folded, (1.5-) 2-5 mm wide, finely veined, green, glabrate, margins and abaxial midvein pilose. Inflorescence a terminal and 1-2 lateral lax, compound, corymbose partial panicles from the upper leaf-like bracts which may elongate to 23 cm; prophyllar bracts often bearing a sterile axillary spikelet; partial panicles very

variable in size, particularly in width, 3.5-20 × (3-) 5-20 cm; lower primary corymb branches and spikelet pedicels often strongly reflexed or recurved at maturity, pilose to glabrous, the lowest primary branches often greatly elongating up to 15 cm; spikelets borne singly at tips of branches or secondary and tertiary branchlets, often nodding, broadly ovoid to globose, 3.2-4.5 × 2.3-4 mm, obtuse or broadly acute at apex, the scales spreading with developing achenes; scales 11-48 per spikelet, submembranous, dorsally obtuse to rounded, glabrous, brown, reddish brown lineolate, margins broadly scarious, midcosta very slender, brown, inconspicuous, the tip pilose or glabrate, shorter than to equaling obtuse to rounded apex of scale, lateral nerves indistinct, distal fertile scales membranous, translucent; fertile scales 9-45, broadly ovate, circular, oblate, subrhombic, or ovate to oblong-ovate (distal scales), 2.3-3 × 1.2-3 mm; sterile scales 2-3, ovate, 1.5-2 × 1.2-2 mm. Stamens 3, the anthers 0.8-1.2 mm long; style 2-branched. Achene biconvex, oblate-obovate to transversely elliptic-obovate, wider than long, 1-1.4 × 1.2-1.5 mm, gradually rounded at apex, truncate at base with 2 lateral rounded swellings on either side of the short 0.2-0.4 mm long strap-shaped stipitate base, transversely rugose, shiny, pale brown to dark brown or blackish at maturity; style base depressed-triangular or lunate, 0.3-0.5 mm long and as wide as achene, 2-lobed, the lobes extending down along margins of achene to about the middle; bristles absent.

General distribution: Central America, Puerto Rico, Trinidad, and northern South America.

Distribution in Puerto Rico: Known in Puerto Rico only from the type collection.

Note: An earlier described name discovered for this species, *Fimbristylis divaricata* Ham., has priority over *Rhynchospora trichodes* C. B. Clarke, a new name that was coined for the illegitimate homonym, *R. hispidula* (Vahl) Boeck. A transfer from *Fimbristylis* to *Rhynchospora* is thus necessary. Because the type of *Rhynchospora hispidula* is from French Guiana and no other record of this species exists from Puerto Rico or anywhere else in the West Indies, the locality of the type specimen of *Rhynchospora divaricata* is questionable. However, this species is known from Trinidad and the collector, Ledru, was known to have collected on that island. This suggests that the specimen may perhaps be mislabeled. Other occurrences of *Rhynchospora divaricata* in Puerto Rico are based on specimens in the Delesert herbarium (G) and Willdenow herbarium (B). A hand sketched rendering and inflorescence fragment of the G specimen at NY shows that it is that species. The sketch of the specimen label reads "Porto rico" only, and below that on the sheet the poor scribbling indicates that Salzmann is the collector. However, Salzmann has not been recorded as collecting in Puerto Rico. His collections in the New World were exclusively from South America, mainly Bahia, Brazil between 1827-1830. The name *Rhynchospora trichodes* was based on *Schoenus hispidulus* Vahl. In his protolog, Vahl (1805) was uncertain of the locality of the specimen he based his new species on citing it as "Habitat in Carolina "(?)" *ex herb. Lamarckii.*" Kunth (1837: 279) indicated that Vahl's new species was from French Guiana, not Carolina, "Guiana (nec Carolina)" and cites a specimen from the Willdenow herbarium (B-Willd. 1116) which strangely enough is labeled by Willdenow as occurring in "Portorico". A photograph of a specimen in B ex US, now probably destroyed, is labeled in Vahl's hand as *Schoenus hispidulus* Vahl, fide Vahl, ex Willd. Herb., and as occurring in "Cajenna" (Cayenne, French Guiana). A label attached to this sheet, in Vahl's hand, is inscribed "*Schoenus hispidulus* Willd. herb. no. 1116, fol 1," and bears a lengthy description of the plant. The B sheet appears to be type material and the specimen in the Willdenow herbarium (B-Willd. 1116) has probably been mislabeled and is from French Guiana.

Fimbristylis divaricata was treated by Steudel (1855) as conspecific with *F. hirtella* Ham., Prodr. 14. 1825, *nom. illeg.*, non Vahl, 1805 (*F. hamiltonii* (Ham.) Steud., as a new name), also cited from Puerto Rico by Hamilton. A search by Odile Poncy, *pers. comm.* of the Desvaux herbarium at P for the type collection of *F. hirtella* Ham. was unsuccessful.

11. Rhynchospora domingensis Urb., Symb. Antill. 7: 170. 1912. *Rhynchospora longiflora* var. *domingensis* (Urb.) Kük., Bot. Jahrb. Syst. 74: 396. 1949. Type: Dominican Republic; vicinity of Constanza. *Türckheim 3325* (holotype: B, destroyed).

Rhynchsopora longiflora of authors, non C. Presl, 1828.

Rhizomatous perennial, 20-75 cm tall; rhizome short, stout; roots medium to coarse, 0.7-1.5 mm thick; sheathing base of culm 3-10 mm wide. Culms sub-erect to ascending, 0.8-3 mm wide, trigonous or triquetrous proximally, obtusely trigonous to subterete distally, stiff and hardened, finely ribbed, scabridulous, often smooth at nodes and at very base, pale brown proximally, green distally, chestnut brown at nodes proximally. Leaves 6-20, ascending, basal and cauline; sheaths somewhat loose, short on basal leaves, longer on cauline leaves, to 6 cm long, herbaceous, finely veined, light brown to brown proximally, golden brown adaxially on basal leaves, glabrous; ligule absent; blades linear-lanceolate, 9-60 cm × 1.8-6 mm, V-shaped proximally to subflattened or subplicate distally, acuminate or long-attenuate to triquetrous apex, finely veined abaxially, finely cellular-reticulate and essentially smooth adaxially, scabridulous abaxially (at least distally), margins and abaxial midvein scabridulous, (at least distally), green. Inflorescence a terminal and series of 2-3 lateral, lax (at maturity), compound, partial corymbiform panicles from the upper sheathing bracts; terminal partial panicle 2-8 × 2-10 cm, the lateral smaller, on slender peduncles to 10 cm long; sheathing bracts equaling to slightly overtopping subtending partial panicles, to 8 cm long; spikelets lanceoloid to fusiform, 8-12 × 1-1.5 (-1.7) mm, long-acuminate at apex, cuneate at base, with 6-8 (9) scales, pedicellate, solitary at branch tips or subfasciculate on secondary branches; fertile scales 3-5, ovate-elliptic (sterile basal scales of spikelet), ovate-lanceolate to oblong-lanceolate or lanceolate (terminal scale of spikelet), 4-7.5 (-8) × 1.6-2.8 mm, slightly curvate keeled, dorsally obtuse to subrounded, herbaceous to thinly herbaceous or submembranous, finely cellular-striate, semi-glossy, light brown, reddish brown medially along midcosta, essentially glabrous, margins narrowly scarious, midcosta fine, extended beyond acute apex as a 0.5-1 mm long awn. Stamens 3, the anthers 2-2.8 mm long, glandular-apiculate, truncate with crystalline trichomes at base; style entire or shortly bi-fid or 2-branched at tip. Achene biconvex, obovate or broadly oblong-obovate, 1.5-2 × 1-1.4 mm, broadly rounded or obtuse at apex, shortly attenuate at base, often margined but indistinctly so, semi-glossy, glossy at maturity, finely and often indistinctly cancellate with 13-20 longitudinal rows of very shallow horizontal pits on each face, pale brown to yellowish brown, brown at maturity; style base lance-attenuate with concave margins, 1.2-2.3 mm long, 0.5-0.7 mm wide at base, flattened, attenuate to apex, shallowly articulated at base, pale brown with reddish lineations or dots; bristles 3-6, subulate, finely antrorsely barbed, pale or reddish, exceeding the achene.

General distribution: Cuba, Hispaniola, and Puerto Rico.

Distribution in Puerto Rico: Forested habitats on slopes, thickets, and along streams. Known to occur only in west-central Puerto Rico in Adjuntas and Jayuya.

Note: Rhynchospora domingensis is closely related to *Rhynchospora longiflora* C. Presl, but characteristically has narrower leaf blades (1.8-6 vs. 8-12 mm wide) and conspicuously red-, purple-, and black-dotted or -lineolate upper culms, sheathing bracts, inflorescence branches, and scales (vs. not conspicuously dotted or lineolate). The culms and abaxial distal portion of leaf blades and sheathing bracts are scabridulous or short appressed-strigose (vs. smooth or essentially so). Spikelet scales are light brown and red-lineolate (vs. dark reddish or rusty brown). Lastly the achenes have more rounded shoulders at apex and are glossy-brown at maturity (vs. abruptly obtuse or subtruncate at apex and yellow-brown).

Selected specimens examined: Puerto Rico: Adjuntas: Guilarte Peak way, *Woodbury s.n.* (NY, UPR). Jayuya: Cerro de Punta, *Liogier et al. 30576* (NY, UPR).

12. Rhynchospora fascicularis (Michx.) Vahl, Enum. Pl. 2: 234. 1805; *Schoenus fascicularis* Michx., Fl. Bor.-Amer. 1: 37. 1803. Type: United States; "Carolina". *Bosc. s.n.* (holotype: P, photo at GH; isotype fragment: NY).

Caespitose, rhizomatous perennial, 30-95 cm tall; rhizome short; roots medium-sized. Culms erect to ascending, 0.6-1.7 (-2) mm wide, obtusely 3-angled proximally to terete distally, subherbaceous, firm, not easily compressed, finely ribbed, green, glabrous. Leaves 4-11, ascending, primarily basal, 3-5 cauline; sheaths short, herbaceous, finely veined, pale brown to brown, glabrous; ligule absent; blades narrowly linear, 6-30 cm × 1-3 mm, V-shaped or involute, herbaceous, finely veined, green to pale, glabrous,

margins essentially smooth, but sometimes remotely and bluntly scabrous, the apex filiform, long-acuminate to antrorsely scabrous apex. Inflorescence a simple fascicle of spikelets or corymbosely compound group of 3-5 fascicles, sometimes with 1-2 lateral fascicles from the upper sheathing bracts; fascicles hemispherical, 5-10 × 5-15 mm; spikelets 3-4 × 1-1.8 mm, ovoid-ellipsoid or ellipsoid, acute to short-acuminate at apex, short-cuneate at base, the spikelet scales 5-6, spreading with maturing achenes; fertile scales 3-4, ovate, 2-3 × 1.3-2.8 mm, often inrolled around flowers, herbaceous to submembranous, dorsally rounded, reddish brown, glabrous, margins narrowly to broadly scarious, erose, acute at apex, midcosta distinct, very narrow, brown to pale brown, lateral nerves indistinct, sides often with fine blackish striations running longitudinally and curving out to the margins. Stamens 3, sometimes 1-2 abortive, the anthers 1-1.5 mm long; style 2-branched. Achene biconvex, obovate to broadly so, suborbicular, or elliptic-obovate, 1.3-2 × 1.1-1.5 mm, indistinctly transversely rugulose to smooth, umbonate or gradually biconvex, dark brown to blackish with a yellowish brown to deep red circular patch medially, acute to abruptly acuminate to base, truncate at apex; style base shallowly triangular to triangular or triangular-subulate, 0.5-1 mm long, 0.7-1 mm wide at base, brown, the margins smooth to sometimes scabrous; bristles 6, filiform, short or rudimentary to exceeding the achene body, reddish, antrorsely barbed, often with trichomes at base.

General distribution: Southeastern United States west to Texas, Mexico, Central America, Greater Antilles, and northern South America.

Note: This species is represented in Puerto Rico by two infraspecific taxa. *Rhynchospora fascicularis* subsp. *fascicularis* var. *distans* (Michx.) Chapm. is known from Laguna Tortuguero only, while *R. fascicularis* subsp. *fascicularis* var. *fascicularis* is more widespread. Below a key is given to distinguish the two.

Key to the varieties of *Rhynchospora fascicularis* subsp. *fascicularis* in Puerto Rico

1. Achenes obovate to broadly so or suborbicular, 1.1-1.5 mm wide, umbonate; style base triangular; bristles short or rudimentary, rarely exceeding achene body..... ***R. fascicularis*** subsp. ***fascicularis*** var. ***fascicularis*** 12a.

1. Achenes elliptic-obovate, 1-1.3 mm wide, not umbonate; style base triangular-subulate; bristles exceeding achene body..... ***R. fascicularis*** subsp. ***fascicularis*** var. ***distans*** 12b.

12a. Rhynchospora fascicularis subsp. **fascicularis** var. **fascicularis.**

(See above for type and general distribution).

Distribution in Puerto Rico: On wet to moist sandy or mossy habitats; swampy areas, savannas, and coastal marshes at low elevation. Cataño, Dorado, Manatí, Mayagüez, Salinas, San Juan, Vega Alta, and Vega Baja.

Selected specimens examined: Puerto Rico: Bayamón: Sabana Llana, *N.L. Britton & E.G. Britton 8700* (NY). Cataño: *Heller & Heller 1380* (NY, US). Dorado: *Woodbury s.n.* (NY); *Johnston 883* (NY). Manatí: western end of Laguna Tortuguero, *N.L. Britton & E.G. Britton 7872* (NY, US). San Juan: Martín Peña, *Stevenson 501* (US). Vega Alta: Bo. Sabana, NE of Regadera, *Proctor 45807* (US). Vega Baja, *Heller & Heller 1313* (NY, US).

12b. Rhynchospora fascicularis subsp. **fascicularis** var. **distans** (Michx.) Chapm., Fl. South U. S. 527. 1860; *Schoenus distans* Michx., Fl. Bor.-Am. 1: 36. 1803; *Rhynchospora distans* (Michx.) Vahl, Enum. Pl. 2: 235. 1805. Type: United States. Carolina, *Michaux s.n.* (holotype: G; holotype fragment: NY).

General distribution: Southeastern United States, Bermuda, and Puerto Rico.

Distribution in Puerto Rico: Known only from Laguna Tortuguero.

Selected specimens examined: Puerto Rico: Vega Baja: Laguna Tortuguero, *Liogier et al. 33592* (UPR). Historically cited for Puerto Rico by C. B. Clarke in Urban, Symb. Antill. 2: 125. 1900, based on *Sintenis 1232* (not located).

13. Rhynchospora filiformis Vahl, Enum. Pl. 2: 232. 1805; *Dichromena filiformis* (Vahl) Kunth, Enum. Pl. 2: 281. 1837; *Spermodon filiformis* (Vahl) Nees in Martius, Fl. Bras. 2(1): 118. 1842. Type: Puerto Rico. *Ledrú s.n.* (holotype: C-Vahl; probable isotype: P).

Rhynchospora podosperma C. Wright in Sauvalle, Anales Acad. Ci. Méd. Habana 8: 87. 1871. Type: Cuba. *Wright 3791* (holotype: GH; isotype: NY!, US!).

Rhynchospora longispicata Boeck., Linnaea 37: 600. 1873. Type: French Guiana. *Sagot 1389* (cited as *Sagot 389*) (lectotype: BM!; isolectotype: K!), here designated.

Rhizomatous perennial, 13-50 cm tall, culms sprouting in close clusters at nodes of rhizome; rhizome short, knotty; roots fine to medium, to 1 mm thick. Culms ascending, bulbous and horizontal at very base, abruptly arched-ascending, trigonous to obtusely trigonous, firm but flexuous, essentially smooth, green, glabrous. Leaves 3-7, ascending, primarily basal, 1-2 lower cauline or sometimes one to about the middle; sheaths soft, finely veined, green, glabrous; ligule a very narrow thickened band of tissue at the adaxial junction of sheath and blade; blades linear-filiform, thickened, 3-40 cm × 0.3-3 mm (unfolded), V-shaped to somewhat crescentform-capillary or trigonous proximally, triangular-channeled distally, often folded proximally, firm but flexuous, finely veined abaxially, smooth, shining, and cellular-reticulate adaxially, green, glabrous, margins generally smooth proximally, antrorsely scabrous on margins distally, the apex attenuate to tip. Inflorescence a terminal and 1-4 lateral corymbose partial panicles from the upper sheathing bracts, the lowermost long-peduncled; terminal panicle 1.5-5 × 0.6-4.5 cm, with (1-) 2-20 (-30) spikelets, rarely reduced to a single spikelet; spikelets linear, narrowly ellipsoid-lanceoloid, (8-) 9-13 (-14) × 1-1.8 mm, attenuate at apex, narrowly cuneate at base, with 6-13 scales; fertile scales 3-9, ovate-lanceolate to linear-lanceolate, 5.3-11.5 × 0.8-2.8 mm, variable in cross section, dorsally rounded and inrolled around developing pistil, lower fertile and sterile scales subcoriaceous, smooth and semi-glossy, glabrous, brown medially, light brown on sides with brown lineations, margins scarious, midcosta pale brown to greenish brown, indistinct, very narrow, prolonged beyond the acute to acuminate apex as an antrorsely scabrous awn, upper fertile scales hidden, thin and membranous, linear-lanceolate. Stamens 3, the anthers 2.5-4 mm long, apiculate, truncate at base with crystalline papillae; style deeply 2-branched. Achene biconvex, obovate to oblong-obovate, 1.5-2.2 (including stipitate base) × 1.1-1.3 mm, truncate to concave at apex, narrowed below to a tounge-like, finely cellular-reticulate stipitate base, relatively smooth or distinctly to faintly cellular-reticulate medially, light brown to brown with a longitudinal gray stripe medially on each side, margins often prolonged at apex on either side as a short tooth, cellular-reticulate-papillose, the epidermal cells bulging at maturity forming a pebbly surface; style base triangular, 0.3-0.5 mm long, 0.3-0.7 mm wide at base, rimmed by the truncate to concave apex of achene, brittle, brownish black; bristles absent.

General distribution: Mexico, Central America, Greater Antilles, and tropical South America.

Distribution in Puerto Rico and the Virgin Islands: Historically known only from a Ledrú collection from Puerto Rico that is the type of the species. However, Britton and P. Wilson (1923) cite a Ledrú collection from St. Thomas. Not collected nor seen since.

14. Rhynchospora gigantea Link in Sprengel, Jahrb. Gewächsk. 1(3): 76. 1820. Type: Brazil. *Hoffmannsegg s.n.* (holotype: B-Willd. 1129, microfiche US ex B).

Coarse, robust perennial, 0.6-1.5 m tall; rhizome short, thick, knotty, hardened; roots coarse, 2-4 mm thick, golden brown, lustrous, spongy, easily compressed with internal chambers. Culms solitary, ascending, (2-) 3-7.5 mm wide, up to 10 mm wide at swollen nodes, finely ribbed, smooth, glabrous, trigonous, somewhat soft and often hollow proximally just below leaf nodes of cauline leaves, firm distally. Leaves 9-20, arched-ascending, spreading, basal and cauline; sheaths spongy-thickened (at least proximally), glabrous, to 20 cm long, smooth proximally, septate nodulose distally; ligule absent; blades narrowly linear, flattened to plicate proximally, those borne from basal sheaths often spongy-thickened proximally, (3.5-) 4-15 dm × (5-) 9-23 (-25) mm, glabrous, abaxial side bright green, distinctly septate-nodulose, adaxial side dark green, lustrous, glossy, smooth, margins and midvein beneath antrorsely scabrous, long-acuminate to triquetrous apex. Inflorescence of 2-5 remote to subcontiguous large compound partial corymbose panicles (including the terminal one), (10-) 12-50 (-60) × 5-15 cm, each subtended at base by a leaf-like

involucral bract, reduced distally, the spikelets congested at ray tips in globose or hemispherical clusters of 20-40, 12-16 mm in diam; spikelets ovoid-ellipsoid, (4.5-) 5-6 (-6.5) × (1.2-) 1.5-2.2 mm, short-acuminate at apex, obtuse at base, with 7-11 scales; fertile scales 4-7, ovate-elliptic, the distal ones ovate-lanceolate to lanceolate, (3-) 4-6 (-6.5) × (2-) 2.2-3.1 (-3.3) mm, thin, uniformly brown, glabrous, finely indistinctly veined, the apex acute to short-acuminate. Stamens 3, the anthers linear, 2-3 mm long; style entire or shortly bi-lobed at apex. Achene elliptic-obovate, 2-2.5 mm × 1-1.2 mm, papillate, transversely rugulose medially on sides, the thickened margins with constrictions and protuberances; style base narrowly triangular, 2-2.8 × 1-1.2 mm, as wide and thick as achene at base, spongy-thickened with a narrow vertical channel medially on each side; bristles 6, exceeding the achene, shorter than to equaling tip of style base, antrorsely barbed.

General distribution: Mexico, Nicaragua, Greater Antilles, and tropical South America.

Distribution in Puerto Rico: In wet sandy or muddy soils, marshy and swampy areas, pastures, ditches, swales, and savannas at low elevation. Dorado, Loíza, Manatí, Mayagüez, San Juan, Toa Baja, Vega Alta, and Vega Baja.

Selected specimens examined: Puerto Rico: Dorado: Bo. San Antonio, *González-Más 350* (US); vicinity of Dorado, *N.L. Britton et al. 6649* (NY). Loíza: Punta Cangrejos, *Johnston & Stevenson* 1675 (NY). Manatí: Laguna Tortuguero, *Liogier et al. 30438* (NY); *Sintenis 6672* (US). San Juan: Santurce, *Heller & Heller 980* (NY, US); Martín Peña, *Stevenson & Johnston 1675* (US). Toa Baja: Rd. 866, km 7.2, Punta Salinas, *González-Más 1145* (US). Vega Baja: Puerto Nuevo, Rd. 686, km 4, *González-Más 1091* (NY, US); vicinity of Vega Baja, *N.L. Britton et al. 5786* (NY).

15. Rhynchospora holoschoenoides (Rich.) Herter, Revista Sudamer. Bot. 9: 157. 1953; *Schoenus holoschoenoides* Rich., Actes Soc. Hist. Nat. Paris 1:106. 1792. Type: French Guiana. *LeBlonde s.n.* (holotype: P).

Schoenus cyperoides Sw., Prodr. 19. 1788, non Retzius, 1786; *Rhynchospora cyperoides* Mart., Denkschr. Königl. Acad. Wiss. München 6: 149. 1817 ("1816"). Type: Jamaica. *Swartz s.n.* (holotype: S-Sw. R-5609).

Rhizomatous perennial, 45-101 cm tall; rhizome short, thickened; roots coarse. Culm ascending, 1.3-3 mm wide, trigonous, firm, finely ribbed, green, smooth, glabrous, the angles smooth proximally to bluntly scabrous distally. Leaves 7-12, ascending, primarily basal, 2-4 lower cauline; sheaths herbaceous, often spongy-thickened, finely veined, septate-nodulose, green to pale brown proximally, glabrous; ligule a very narrow, thickened band or flap of tissue at adaxial junction of sheath and blade, inconspicuous on upper sheaths; blades narrowly linear, 13-75 (-82) cm × 2.2-6 (-6.5) mm (unfolded), often folded and spongy-thickened proximally, flattened distally, herbaceous, finely veined, septate-nodulose, sometimes indistinctly so, green, glabrous, margins and midvein beneath antrorsely scabrous, the apex attenuate to triquetrous apex. Inflorescence a single and often 1-2 lateral simple to compound open corymbs; terminal corymb 4-13 × 3.5-10 cm, the heads of spikelets 2-20, 7-13 mm in diam; spikelets numerous, tightly compacted in globose capitula, ovate-elliptic, (2.5-) 3-5 × 1.1-1.8 mm, often longitudinally falcate, acuminate at apex, obtuse at base, with 5-8 scales; fertile scales 3-5, ovate to ovate-elliptic, 2.4-4.2 (-4.5) × 1.4-2.5 mm, thin, membranous, curvate-keeled, often somewhat longitudinally folded, acute to acuminate at apex, reddish brown or golden brown, lustrous, glabrous, margins erose, midcosta indistinct except at apex, dark brown, extending as smooth to bluntly scabrous short mucro, lateral nerves. Stamens 3, 2 in terminal scale of spikelet, the anthers 1.1-1.8 mm long, apiculate; style entire or sometimes shortly bi-lobed at apex. Achene biconvex, 2-sided, widely obovate to narrowly obovate, 1.4-2 × (0.9-) 1-1.5 (-1.6) mm, rounded at apex, cuneate to base, finely transversely rugulose, often indistinctly so and appearing smooth, shiny, lustrous, brown to dark brown or grayish brown, the margins above middle antrorsely scabrous; style base linear-lanceolate, 4-angled, 1.8-3.1 mm long, 0.2-0.4 (-0.6) mm wide at base, antrorsely scabrous on margins, pale brown to reddish brown; bristles 6, filiform, terete in cross section, antrorsely barbed, reddish, to 3 mm long, surpassing achene, shorter than to equaling tip of style base.

General distribution: Mexico, Central America, West Indies, tropical South America, Africa, and Madagascar.

Distribution in Puerto Rico: Occurring in a diversity of wet habitats including, swampy grounds, savanna, meadows, open fields, grassy areas, marshy areas, pastures, wet mountain forests, dry scrub forests, clearings, hollows, peaty hillsides, roadside ditches, and exposed and disturbed sites generally at low and middle elevations, but occurring at high elevation in the Luquillo Mountains. Arecibo, Camuy, Cayey, Ceiba, Ciales, Cidra, Dorado, Fajardo, Guayama, Humacao, Loíza, Luquillo, Manatí, Maricao, Maunabo, Mayagüez, Moca, Naguabo, Patillas, Río Grande, San Juan, San Sebastián, Vega Alta, Vega Baja, and Yabucoa.

Selected specimens examined: PUERTO RICO: Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10568* (MAPR, UPRRP, US). Cayey: Bo. Guavate, edge of Carite Commonwealth Forest, *Breckon & Lewis 4033* (MAPR, MO); Cerro La Santa, Guavate, *Liogier et al. 33506* (MO, NY). Ceiba: Caribbean National Forest, near Pico del Este, *Axelrod 8352A* (UPRRP). Ciales: *Sargent 3052* (US). Cidra: Pueblo Viejo, *Hioram 313* (US). Dorado: *Johnston 895* (US). Fajardo: *Sintenis 1236* (US). Guajataca: Boy Scout Reservation, hwy. 119, km 18, south from Camuy, *Wadsworth 175* (NY). Guayama: Carite Forest Reserve, *Axelrod et al. 608* (NY, UPRRP). Humacao: Pozal, Playa de Humacao, *Eggers 588* (US). Luquillo: top of El Yunque Mt., *González-Más 1536* (MAPR, NY, US); Santa Catalina, *Stevens & Hess 2745* (MAPR, NY). Manatí: Laguna Tortuguero, *N.L. Britton et al. 3846* (NY). Maricao: *González-Más 457* (NY, US). Maunabo: Cuchilla de ls Panduras, *Axelrod et al. 2055* (UPRRP). Mayagüez: Guanajibo, *Fredholm 4586* (MAPR). Moca to Mayagüez, *González-Más 4011* (MAPR). Naguabo: Sierra de Luquillo, Caribbean National Forest, *Proctor & Thomas 43204* (US). Patillas: on the property of Tropic Ventures, along Rt. 184, just S of Carite, *Miller et al. 6586* (MO, UPRRP). Río Grande: Luquillo Mountains, *Acevedo-Rdgz. 10515* (MAPR, UPRRP, US). San Juan: Río Piedras to Trujillo Alto, *Chase 6368.5* (US); Laguna San José, *Hioram s.n.* (NY). San Sebastián: *Sargent 244* (US). Vega Baja: Tortuguero Lagoon, *González-Más 1060* (NY, US). Yabucoa: Punta Guayanes, *Axelrod et al. 2749* (MO, NY, UPRRP).

16. Rhynchospora jamaicensis Britton, Bull. Torrey Bot. Club 41: 1. 1914. Type: Jamaica; Hardwar Gap. *Britton 3322* (holotype: NY!).

Rhizomatous perennial, 50-175 cm in length; rhizome short, knotty; roots medium to coarse, to 1 mm thick; sheathing base of culm about same width of culm distally, with few nodes. Culms often clumped together on rhizome, ascending to scandent or trailing, 1.8-4 mm wide, trigonous proximally, triquetrous to compressed trigonous distally, hardened, finely ribbed, light brown with brown nodes proximally, green distally, short pilose to glabrate, the nodes few and remote proximally, many and approximate medially. Leaves 8-30, ascending, spreading, primarily cauline; sheaths elongate proximally, short medially, herbaceous, finely veined, green, short pilose abaxially to wooly on inner band, the inner band herbaceous; ligule absent; blades linear, 6-36 cm × 2-7 mm, plicate or subflattened proximally with dorsally obtuse to rounded pleats, the margins often involute, attenuate to triquetrous apex, herbaceous, finely veined abaxially with dull surface, glossy and somewhat smooth adaxially with two lateral veins evident, margins and abaxial midvein antrorsely scabrous or setose-scabrous (at least distally), green, short pilose abaxially (at least proximally), glabrous adaxially or short pilose-scabrous on sides, particularly distally, the adaxial midvein closely strigose. Inflorescence a terminal and series of 3-6 lateral, remote to subcontiguous, compound, pyramidal partial panicles from the upper sheathing bracts; sheathing bracts reduced distally, overtopping proximal partial panicles, shorter than to slightly exceeding terminal panicle; terminal panicle 4-7 × 3-6 cm, the lateral smaller, gradually reducing in size proximally, on short, erect, stiff peduncles; panicle branches pilose to glabrescent; spikelets 20-160 per partial panicle, ovoid-lanceoloid, 4-7 × 1-1.7 mm, acuminate at apex, short-cuneate at base, with 8-12 scales; fertile scales 5-9, ovate-elliptic to ovate-lanceolate, (2.6-) 3-5.5 × 1.6-2.7 (-3) mm, boat-shaped, slightly curvate, dorsally obtuse to rounded, thinly herbaceous, finely cellular-striate, dull (flat), brown with lighter brown or reddish brown margins, glabrous, margins narrowly scarious, entire, midcosta fine, inconspicuous, pale, extended beyond the acute to acuminate apex as a mucro. Stamens 2, the anthers 1.5-2.2 mm long,

subulate-apiculate, truncate at base with minute crystalline papillae or lobes; style shortly 2-branched at apex. Achene biconvex, sometimes unequally so, broadly obovate to rounded-obovate, 0.8-1.1 × 0.7-1 mm, obtuse to rounded or subtruncate at apex, widely cuneate to rounded at base, cellular-cancellate with 11-16 longitudinal rows or cells, glossy, brown, the cell walls light brown; style base triangular-lanceolate, 0.9-1.5 mm long, 0.5-0.7 mm wide at base, flattened, shallowly 2-lobed at base, brittle, crustose, light brown to brown, often whitened; bristles rudimentary or 1-2, subulate, antrorsely barbed, reddish, shorter than to rarely equaling achene.

General distribution: Greater Antilles.

Distribution in Puerto Rico: Occurs in moist montane forests from 800-1300 m; openings on wet slopes, thickets on road banks, forest trails, and roadside ditches. Adjuntas, Cayey, Ceiba, Jayuya, Juana Díaz, Luquillo, Orocovis, Ponce, Río Grande, San Lorenzo, and Yauco.

Note. This species was placed in synonymy with *Rhynchospora polyphylla* (Vahl) Vahl by Kükenthal (1949). However, it differs from *R. polyphylla* in having pubescence abaxially on sheaths and leaf blades (vs. essentially glabrous); spikelets 4-7 × 1-1.7 mm (vs. 3-5 × 1 mm); spikelet scales that are brown with lighter brown or reddish brown margins (vs. uniformly stramineous to light reddish brown); achenes 0.7-1 mm broad (vs. 0.6-0.8 mm broad); achene surfaces with 11-16 longitudinal rows of cells on each face (vs. 5-10 longitudinal rows); and a triangular-lanceolate style base 0.9-1.5 mm long (vs. narrowly triangular and 0.3-0.7 mm long).

Selected specimens examined: Puerto Rico: Adjuntas: Alto de la Bandera, *Stevens 8254* (NY); Monte Guilarte, *Liogier et al. 30313* (NY). Ceiba-Naguabo: Caribbean National Forest, along road near Pico del Este, *Axelrod 8365* (UPRRP). Jayuya: Near Cerro de Punta, *Liogier 10832* (NY, US). Juana Díaz: *Sargent 3196* (US). Luquillo: road toward top of El Yunque, *González-Más 1545* (MAPR, NY, US); Near Pico de Este, Luquillo Mts., *Liogier et al. 33302* (NY). Río Grande: Caribbean National Forest, along Mt. Britton trail, *Axelrod 6216* (US). San Lorenzo: Sierra de Cayey, Carite Forest Reserve, *Proctor et al. 47103* (US).

17. Rhynchospora lindeniana Griseb., Cat. Pl. Cub. 244. 1866. Type: Cuba. *Linden 1945* (holotype: GOET; isotype: GH!).

Rhynchospora bahamaensis Britton, Torreya 13: 217. 1913; *Rhynchospora lindeniana* var. *bahamaensis* (Britton) Gale, Rhodora 46: 223. 1944. Type: Bahamas. *Britton & Brace 588* (holotype: NY).

Caespitose perennial forming dense tussocks, 10-75 cm long; rhizomes short, inconspicuous; roots medium, to 1 mm thick. Culms ascending, 0.3-0.8 mm wide, obtusely trigonous to subterete, slender to filiform, firm but flexuous, very finely ribbed, smooth, light green, glabrous. Leaves numerous, erect, spreading, primarily basal, 1-3 lower cauline; sheaths finely veined abaxially often indistinctly red-dotted, pale green to pale brown, glabrous; ligule essentially absent except for a thickened area of tissue at adaxial junction of sheath and blade; blades setaceous to linear-setaceous, 4-50 cm × 0.2-1 (1.2) mm, flattened-crescentform to widely v-shaped, or subplicate, long-attenuate to apex, abaxial surface smooth with a single prominent pale midvein, often scabrous distally, lateral veins indistinct, adaxial surface semi-glossy, finely transversely rugulose, sometimes indistinctly so, margins very finely serrate-scabrous, light green, glabrous. Inflorescence a terminal and series of 3-5 lateral corymbose partial panicles from the upper sheathing bracts; corymbiform partial panicles small, congested, 6-20 (-30) × 4-10 mm, the proximal on long, flattened-setaceous peduncles, antrorsely scabrous on margins, 0.2-0.3 mm wide; spikelets ovoid-ellipsoid, 2-3 (-3.2) × 0.6-1 mm, acute to acuminate at apex, narrowly cuneate at base, with 5-7 scales; fertile scales 1-3, widely ovate to rounded-ovate, 1-1.7 × 1-1.5 mm, curvate-keeled, dorsally obtuse to rounded, deeply boat-shaped, thinly herbaceous to thickly membranous, finely cellular striate or roughened, semi-glossy, dark brown to ferruginous, dark brown on sides, glabrous, margins broadly whitish scarious, midcosta fine, indistinct, pale green, prolonged as a short mucro beyond the acute to obtuse apex. Stamen 1, the anther 0.6-1 mm long, apiculate, truncate at base; style 2-branched. Achene plano-convex or unequally biconvex, ovate to oblong-ovate, 1.1-1.5 × 0.7-0.9 mm, narrowed to a truncate apex, acute to cuneate at base, indistinctly transversely rugulose, semi-glossy to glossy, light reddish brown to dark brown or red medially; style base triangular-acuminate or sometimes prolonged and subulate, compressed, 0.6-1 mm long, 0.5 mm

wide at base, whitish; bristles 6, subulate, fragile, weakly ascending, finely and closely antrorsely barbed, reddish or reddish brown, exceeding achene, shorter than to equaling the tip of style base, clustered on abaxial side of achene.

General distribution: Mexico (Quintana Roo), Guatemala, and the Greater Antilles.

Distribution in Puerto Rico: On serpentine soils in open forests, along trails, rocky slopes and ravines, gravelly areas, and thickets, primarily in uplands, 600-900 m. Maricao, Mayagüez, Sabana Grande, San Germán, and Yauco.

Note: Gale (1944) treated *Rhynchospora bahamaensis* Britton as a variety of *R. lindeniana.* She separated typical *R. lindeniana* from var. *bahamaensis* by its longer spikelets (3-3.2 mm long vs. 2-2.4 mm long respectively); spikelets with a solitary achene vs. having 2 achenes; and longer achenes (1.2-1.4 mm long vs. 1.1-1.2 mm long respectively). However, spikelets of the isotype are 2-2.6 mm long and have 2 achenes, as in var. *bahamaensis*, and the difference in the length of the achenes is not significant. Achenes from the type of *R. lindeniana* are plano-convex with a nearly flat or slightly concave side, characteristic of those of *R. bahamaensis* in which the developing achenes are nearly parallel to each other on the rachilla and tightly pressed together at maturity, the nearly flat or slightly concave side being where the two achenes press against each other. We were not able to find a single, consistent character to separate these two taxa and they are here treated as conspecific.

Selected specimens examined: PUERTO RICO: Maricao: Indiera Fría, *N.L. Britton et al. 4540* (NY); mountain ridge E of Río Pastrero, *Proctor et al. 45212* (US); Río Maricao, *N.L. Britton et al. 2427* (NY, US); Maricao to Monte Alegrillo, *N.L. Britton et al. 2552* (NY, US); Monte Alegrillo, *Hess 598* (MAPR, NY); Monte de Estado, *Caminero & García 147* (MAPR). Mayagüez: Las Mesas, *Liogier 10522* (NY, US). Sabana Grande: Bo. Susúa Alta, Susúa Forest Reserve, *Axelrod et al. 10189* (UPRRP, US). Yauco: Susúa, *Woodbury s.n.* (NY).

18. Rhynchospora marisculus Nees in Martius, Fl. Bras. 2(1): 142. 1842. Lectotype: Brazil; Rio de Janeiro. *Martius 3193* (M), designated by T. Koyama, Mem. New York Bot. Gard. 23: 56. 1972.

Rhynchospora borinquensis Britton, Bull. Torrey Bot. Club 42: 387. 1915. Type: Puerto Rico; Sierra de Naguabo. *Shafer 3515* (holotype: NY!; isotype: US!).

Rhizomatous perennial, 62-170 cm tall; rhizome short, thick, woody. Culms crowded along rhizome, ascending, 1.5-4.5 mm wide, trigonous to obtusely trigonous, stiff, hardened and brittle, asperous with minute whitish blisters or prickles, finely ribbed, pale green, glabrous. Leaves 8-15, ascending, basal and cauline, the lowermost bladeless; sheaths short, somewhat stiffened, finely veined, green to pale green, often tinged with brown, glabrous; ligule absent; blades narrowly linear, 7-90 cm × (1.2-) 1.5-7.5 (-10) mm, plicate to subflattened, substiffened, green, semi-glossy adaxially, asperous with minute whitish blisters or prickles abaxially, smooth and finely veined (indistinctly so) adaxially, glabrous, smooth proximally, finely antrorsely serrate-scabrous distally, long-acuminate to triquetrous tip. Inflorescence a terminal and series of 2-4 lateral compound partial corymbs with erect to strongly ascending branches from the upper sheathing bracts; corymbs strict, the terminal corymb 5-17 × 1.5-4 cm, often curving or nodding at maturity, with typically well over 100 spikelets, the spikelets in fascicles at branch tips; spikelets narrowly ovoid-ellipsoid to ovoid-lanceoloid, often slightly curvate, 4.5-6 (-6.5) × 0.8-1.5 mm, acuminate at apex, narrowly cuneate at base, with 5-10 scales; fertile scales 2-6, ovate-elliptic to ovate-lanceolate or linear ovate-lanceolate, 3.4-5 × 1.2-2.4 mm; upper fertile scales of spikelet reduced, thin, subtranslucent or membranous, yellowish brown, but with perfect flowers; lower fertile scales of spikelet dorsally obtuse to rounded, thin to submembranous, finely striate, brown or tinged with reddish brown, often with dark brown lineations, glabrous, midcosta fine, pale reddish brown, extending beyond apex as a mucro on distal scales of spikelet, as a short awn on proximal scales of spikelet, lateral nerves indistinct, margins entire, narrowly scarious, the apex acute to acuminate. Stamens 3, the anthers 1.5-2.3 mm long, lobed with crystalline projections at base, subulate and awl-like at tip, bearing minute crystalline projections; style 2-branched. Achene biconvex, sometimes with unequal sides, the abaxial side usually more tumid than the adaxial

side, obpyriform, 1.5-2 × 0.8-1.2 mm, subattenuate to base, rounded to subtruncate at apex, transversely rugulose, semi-glossy, yellowish brown, margins and apex of achene body forming a narrow, constricted edge, pale at junction with style base; style base triangular-lanceolate, flattened, 1.2-1.6 mm long, 0.5-0.7 mm wide at base, brittle, pale brown to brown or sometimes whitish; bristles 6, subulate to compressed-subulate, 3-6 mm long, often 3 times as long as achene body, overtopping achene and style base, finely antrorsely barbed, reddish.

General distribution: Mexico (Chiapas, Veracruz), Central America, West Indies, and South America south to Argentina.

Distribution in Puerto Rico: Known only from wet openings in forested areas in the Luquillo and Naguabo Mountains, in the municipalities of Ceiba, Naguabo, and Río Grande.

Selected specimens examined: Puerto Rico: Ceiba-Naguabo: Caribbean National Forest, near Pico del Este, *Axelrod et al. 10171* (UPRRP). Luquillo: Near Pico del Este, Luquillo Mts., *Liogier et al. 33291b* (NY). Naguabo: road 191, km 13.5, Sierra de Luquillo, *González-Más 1418* (MAPR, NY). Río Grande: El Yunque, *Sargent* 526 (US).

19. Rhynchospora microcarpa Baldwin ex A. Gray, Ann. Lyceum Nat. Hist. New York 3: 202. 1835. Lectotype: United States; North Carolina. *Curtis s.n.* (NY), designated by W. W. Thomas, Brittonia 44: 33. 1992.

Caespitose perennial, (35-) 50-85 (-110) cm tall; rhizome short, inconspicuous. Culms ascending, 1-3.2 (-4) mm wide, obtusely trigonous, hardened but flexuous, finely and coarsely ribbed, smooth, green, glabrous. Leaves numerous, ascending, primarily basal, 2-4 cauline; sheaths elongate, thickly herbaceous, finely veined, green distally, pale brown proximally, glabrous; ligule absent; blades linear, 7-52 cm × (0.7) 1-3.5 (-4) mm (flattened), thickly herbaceous, flattened, V-shaped, or subfolded, often spirally twisted and contorted distally with age, long-attenuate to triquetrous apex, finely veined abaxially, very finely cellular-reticulate and subsmooth adaxially, margins and abaxial midvein antrorsely scabrous distally, smooth proximally, green, glabrous. Inflorescence a terminal and series of 1-3 (-5) lateral corymbose partial panicles from the upper sheathing bracts; partial panicles, (1-) 1.5-8 × 1-6 cm, the smaller lateral panicles on relatively short peduncles 1-5 cm long, spikelets in small fascicles at branch tips; spikelets ovoid to ovoid-globose, 2.5-3.5 (-4) × 1.5-2 mm, acute to narrowly acute at apex, acute to sub-rounded at base, with 6-9 scales; fertile scales 3-6, widely ovate to rounded or very broadly obovate, 1.5-2.7 (-3) × 1.3-2.6 mm, deeply boat-shaped or cuplike, curvate-keeled, dorsally obtuse to subrounded, thinly herbaceous, finely cellular-striate, semi-glossy, dark brown to brownish black, glabrous, margins scarious to narrowly so, erose, midcosta very fine, extended beyond the obtuse to broadly obtuse or emarginate apex as a short mucro Stamens 3, the anthers (0.5-) 1-2 mm long, minutely apiculate, truncate with crystalline papillae at base; style 2-branched. Achene thinly biconvex, obovate to widely depressed-obovate, 1.1-1.5 × 0.8-1.3 (-1.4) mm, obtuse to subtruncate at apex, cuneate at base, deeply alveolate, slightly transversely rugose, glistening, pale brown to brown or red-brown; style base short, deltate, flattened (2-sided), 0.2-0.5 mm long, 0.5-1 mm wide at base, brown; bristles 6, stiffly erect, antrorsely barbed, reddish, varying in length, reaching ½ length of achene body to equaling or shortly exceeding the tip of style base.

General distribution: Southeastern United States west to Texas, Belize, and the Greater Antilles.

Distribution in Puerto Rico: On wet sand of savanna and thickets, Laguna Tortuguero and vicinity in the municipalities of Manatí and Vega Baja.

Selected specimens examined: Puerto Rico: Manatí: Laguna Tortuguero, *N.L. Britton & E.G. Britton 8128* (NY, US). Vega Baja: Tortuguero Lake, *González-Más & Seda 2171* (MAPR); *González-Más 1082* (NY), *2173* (US).

20. Rhynchospora nitens (Vahl) A. Gray, Manual, ed. 5. 568. 1867; *Scirpus nitens* Vahl, Enum. Pl. 2: 272. 1805; *Psilocarya nitens* (Vahl) A. W. Wood., Amer. Bot. Fl. 364. 1870. Type: United States; "Carolina," *Bosc s.n.* (holotype: probably at C-Vahl).

Psilocarya portoricensis Britton, Bull. Torrey Bot. Club 42: 387. 1915. Type: Puerto Rico; Laguna Tortuguero. *Britton et al. 3850* (holotype: NY!).

Caespitose annual, extremely variable vegetatively in size, 4.5-85 cm tall; roots fine to medium. Culms erect to ascending, 0.5-4.5 mm wide, compressed-trigonous, obtusely 4-angled (rectangular), or subterete, soft, surface appearing roughened under high magnification due to very fine cellular reticulation, finely and coarsely longitudinally ribbed, deeply longitudinally channeled along one side, remotely scabrous along edges of channel, pale green to green, glabrous. Leaves numerous, ascending, basal and cauline, the upper ones (sheathing bracts) subtending inflorescence corymbs; sheaths short, herbaceous, inflated, finely veined, green, glabrous; ligule absent; blades narrowly linear, 4-58 cm × 1-7 (-8) mm, flattened proximally, often folded or subinvolute distally, finely veined, midvein indistinct on adaxial side of blade, surface appearing roughened due to very fine cellular reticulation, remotely scabrous to smooth on margins and midvein abaxially, regularly scabrous on margins and midvein distally near apex, green, glabrous. Inflorescence a series of (1-) 2-4 simple to compound corymbs of ascending rays from the upper sheathing bracts, the terminal corymb 0.7-19 × 0.8-15 cm wide; sheathing bracts reduced distally, generally narrower and shorter than leaf blades; spikelets ovoid to oblong-ovoid with acute apex, (3.8-) 4-8 (-9) × (1.8-) 2-2.8 (-3) mm, acute at apex, broadly obtuse to sub-rounded at base, with only one sterile basal scale above prophyllar bract; fertile scales numerous, ovate to ovate-deltate, 2.1-3 × (1.5-) 1.7-2.2 mm, thin, somewhat translucent, widely boat-shaped, dorsally acute to obtuse, minutely longitudinally striate, medium brown to reddish brown with very fine dark brown or blackish lineations, glabrous, margins entire, the narrow midcosta distally pale brown and proximally dark brown, often extending beyond the acute apex as a short mucro on proximal scales, lateral nerves indistinct. Stamens 2, the anthers 0.7-1 mm long; style 2-branched. Achene widely biconvex, obovate to broadly obovate or subrounded, broadly rounded to subtruncate at apex, obtuse to sub-rounded at base, 1-1.1 × 1 mm, transversely rugose, cellular-reticulate at base, lustrous, yellowish brown to golden brown, maturing to dark reddish brown or brown-black, the rugae often lighter in color; style base depressed-triangular, mustache-shaped, 2-lobed at base, 0.2-0.6 mm long, about as wide as achene body at its base, crustose, pale brown to subwhitened; bristles absent

General distribution: Eastern and southeastern United States west to Texas, Belize, Nicaragua, and the Greater Antilles.

Distribution in Puerto Rico: In wet muddy areas over white silica sand, Laguna Tortuguero and vicinity, in the municipalities of Manatí, Vega Alta, and Vega Baja.

Selected specimens examined: Puerto Rico: Manatí: W side of Rt. 687, SE side of Laguna Tortuguero, *Strong et al. 415* (GMUF). Vega Alta: Bo. Sabana, near drainage canal, ca. 1.8 km due NE of jct. Rds. 690 and 691 (Regadera), *Proctor et al. 47743* (US); *Proctor & Thomas 44143* (US).Vega Baja: Bo. Algarrobo, just S of Laguna Tortuguero, *Proctor et al. 45032* (US).

21. Rhynchospora odorata C. Wright ex Griseb., Cat. Pl. Cub. 242. 1866. Type: Cuba. *Wright 3787* (lectotype: US!; isolectotypes: GH, NY!), here designated.

Rhynchospora marisculus sensu Britton & P. Wilson, Bot. Porto Rico 5: 105. 1923, non Nees von Esenbeck, 1842.

Perennial, 0.7-1.5 (-1.8) m tall; rhizome stout, emitting short, scaly stolons to 4 cm long; roots medium to coarse, to 1.5 mm thick. Culms ascending, stout, 1.5-5.5 (-6) mm wide, trigonous, hardened, finely ribbed, smooth, green, glabrous. Leaves arched-ascending, spreading, basal and cauline, the cauline reduced distally on culm; sheaths short on basal leaves, herbaceous, finely veined, pale brown proximally, light green distally, glabrous; ligule absent; blades linear, 7-67 cm × (3-) 4-8 (-10) mm, flattened, attenuate to triquetrous tip, finely veined abaxially, very finely cellular-reticulate adaxially, margins and abaxial midvein antrorsely scabrous (at least distally and at apex), essentially smooth, green, glabrous. Inflorescence a terminal and 1-4 (5) lateral, remote (at least proximally), compound, corymbiform-fasciculate partial panicles from the upper sheathing bracts; terminal partial panicle 3-10 (-15) × 2-5 cm; spikelets ovoid, 5.6-8 × 1.5-2.6 mm, acuminate at apex, short-attenuate to abruptly narrowed at base, with 7-10 scales; fertile scales 3-5, widely ovate-elliptic, 3.5-6.5 × 2.2-3.4 mm, deeply boat-shaped, curvate-keeled, dorsally obtuse, thinly herbaceous, finely cellular striate,

semi-glossy, ferrugineous, glabrous, margins escarious or at most very narrowly so, midcosta fine, pale brown to brown, extended beyond acuminate to attenuate slightly recurved apex as a 0.3-1 mm long awn. Stamens 3, sometimes marescent, the anthers of lower fertile flowers 1.7-3.3 mm long, those of terminal scales often twice as small, apiculate, truncate and minutely lobed at base; style deeply 2-branched. Achene biconvex, tumid, rounded-obovate, 1.6-2 (-2.1) (including stipe) × (1.3-)1.4-1.6 mm, rounded to a truncate apex, shortly attenuate at base to a 0.5 mm long glossy reddish brown stipe, transversely rugulose, finely cellular oblong-cancellate between the rugae, dull, brown or dark brown; style base shallowly deltate with an ellipsoid rim at base (as seen from above), 0.6-1.1 mm long, 0.9-1.1 mm wide at base, subflattened, with setose margins, brown, often with a crusty whitened surface; bristles 6, ascending to spreading, subulate, finely antrorsely barbed, setose at base, reddish, usually well exceeding the tip of style base, to twice length of achene.

General distribution: Southeastern United States and the Greater Antilles.

Distribution in Puerto Rico: On wet white silica sand in open areas or among thickets, Punta Cangrejos and Laguna Tortuguero and vicinity. Carolina, Manatí, and Vega Baja.

Note: Wright in Sauvalle, Fl. Cub. (179: 1868) cited *R. odorata* with his collection number *3787*. However, the original protologue for this taxon appeared earlier in Grisebach's Cat. Pl. Cub. (242: 1866) where no collection number is given for the cited material: "Cuba occ. pr. Hanabana, in humidis, (Wr. a. 1865)". The locality of this material is unknown, so the specimen cited later by Wright (*Wright 3787*) is formally chosen here as lectotype for *R. odorata*.

Selected specimens examined: Puerto Rico: Carolina: Punta Cangrejos, *Stevenson 1706* (US). Manatí: Tortuguero, *Woodbury s.n.* (NY, US).

22. Rhynchospora plumosa Elliott, Sketch Bot. S. Carolina 1: 58. 1816. Type: United States; Florida. *Baldwin s.n.* (holotype: PH; isotype: NY).

Caespitose perennial, 8-60 (-75) cm tall; rhizome short, thickened, knotty; roots medium, to 1 mm thick. Culms erect, 0.4-1.5 mm wide, slender, terete proximally to compressed-trigonous with rounded angles distally, finely ribbed, smooth proximally to sparsely scabrous on margins distally at apex, pale brown to brown proximally, green distally, glabrous. Leaves numerous, ascending or sometimes arching, primarily basal, 1-3 cauline; sheaths short, herbaceous, finely veined to coarsely so on basal sheaths, pale brown to brown or sometimes dark brown on basal leaves, glabrous; ligule absent; blades filiform, 2-40 cm × 0.2-1.5 (-1.7) mm, crescentform proximally to crescentform-capillary distally, articulated towards apex and becoming flattened-trigonous to flattened, attenuate to apex, margins smooth proximally, antrorsely scabrous distally above articulation, finely veined, smooth, green, glabrous. Inflorescence a single terminal small contracted corymbiform panicle at apex of culm, rarely a second lateral one below, 0.6-4 × 0.4-1 (-1.5) cm, subtended at base by a single sheathing bract, overtopping panicle, to 12 cm long; spikelets ovoid to ovoid-ellipsoid, (2.5-) 2.8-5 × 1-1.5 mm, short-attenuate to sharp tip at apex, cuneate to short-attenuate at base, in congested fascicles at branch tips, with 5-6 scales; fertile scales 1 (2), rounded-ovate or rounded-obovate, 1.7-3.7 (-4.2) × 1.4-2.5 (-2.7) mm, curvate-keeled, dorsally widely obtuse to rounded, finely cellular-striate, semi-glossy, dark brown, often dark brown on sides, glabrous, margins escarious or at most narrowly scarious, midcosta fine, indistinct proximally, pale distally, mucronulate at the obtuse to acute or sharply acute apex. Stamens 2-3, the anthers small, 0.3-0.7 mm long, apiculate, truncate at base; style 2-branched. Achene broadly biconvex (nearly rounded in cross section), obovoid, 1.4-1.8 × 1-1.3 mm, rounded at apex, cuneate at base, transversely rugulose to ridged, uniformly rusty brown; style base depressed, conical-apiculate or discoid, 0.2-0.5 mm long, 0.5-0.7 mm wide at base, articulated at base with achene, often with tufts of crystalline fimbrillae along each margin at base, light brown; bristles 6, silvery plumose to near apex, subulate and antrorsely barbed at apex, closely investing achene, slightly shorter than achene to exceeding the tip of the style base, incurved at apex, the tips of the longer ones often meeting just above apex of style base.

General distribution: Southeastern United States west to Texas, Central America, and the Greater Antilles.

Distribution in Puerto Rico: On wet, white silica sand in open areas, known only from north-central Puerto Rico, in the vicinity of Laguna Tortuguero and Dorado. Dorado, Vega Alta, and Vega Baja.

Selected specimens examined: PUERTO RICO: Vega Baja: Tortuguero, 12 Mar 1960, *Woodbury* s.n. (US); 1970, *Woodbury* s.n. (US); Jan 1975, *Woodbury s.n.* (NY, US).

23. Rhynchospora pusilla Chapm. ex M. A. Curtis, Amer. J. Sci. Arts 57: 409. 1849. Type: United States; Florida. *Chapman 4473* (holotype: NY).

Rhynchospora intermixta C. Wright in Sauvalle, Anales Acad. Ci. Méd. Habana 8: 88. 1871. Type: Cuba; Pinar del Río. *Wright 3794* (holotype: GH; probable isotype: NY).

Rhynchospora bruneri Britton in Britton & P. Wilson, Bot. Porto Rico 5: 103. 1923. Type: Puerto Rico; Luquillo Mountains. *Britton & Bruner 7630* (holotype: NY!; isotypes: UPR!, US!).

Caespitose perennial, 8-40 cm tall; rhizome inconspicuous; roots fine, capillary. Culms ascending, 0.3-0.7 mm wide, filiform, trigonous with blunt angles proximally to compressed trigonous or subterete distally, delicate, flexuous, finely ribbed, smooth, green, glabrous. Leaves numerous, ascending, basal and 1-2 lower cauline; sheaths short, herbaceous, finely veined, pale brown, glabrous; ligule absent; blades short, 2-25 cm × 0.2-0.7 mm, setaceous, involute proximally, becoming filiform and canaliculate, flexuous, often curving or wavy, attenuate to triquetrous or subflattened tip, finely veined abaxially, finely cellular reticulate adaxially, antrorsely scabrous on margins distally, green, glabrous. Inflorescence a terminal and series of 1-2 lateral, small, open or subdense, compound, partial corymbiform panicles from the upper sheathing bracts; terminal corymb 1-2.5 × 0.4-1 cm, the lateral corymbs smaller, on short peduncles; sheathing bracts equaling to shortly exceeding corymbs, to 3 cm long; spikelets ovoid, terete, 1.8-2.6 (-3) × 0.5-1 mm, acute to narrowly acute at apex, cuneate at base, fasciculate at tips of short primary branches, rarely solitary, short-pedicellate, with 4-8 scales; fertile scales 2-5, ovate to broadly ovate or rounded-ovate, 1.4-1.8 × 1.2-1.6 mm, deeply boat-shaped, curvate-keeled, dorsally obtuse to subrounded, submembranous, finely cellular-striate, semi-glossy, brown, margins scarious, often undulate, midcosta slender, pale, extended beyond the obtuse to sub-rounded apex as a short mucro. Stamens 1-3, the anthers 0.4-1.2 mm long, bluntly apiculate, truncate at base; style 2-branched. Achene biconvex, oblong-obovate, 0.7-0.9 × 0.5-0.6 mm, rounded at apex, attenuate to a short stipe at base, transversely rugulose, stramineous to brown; style base short bulbiform, 0.1-0.2 mm long, 0.3-0.4 mm wide at base, reddish brown; bristles absent.

General distribution: Southeastern United States west to Texas, Mexico (Chiapas, Tabasco), and the Greater Antilles.

Distribution in Puerto Rico: White silica sands of Laguna Tortuguero and vicinity and in exposed rock crevices on and near summit of El Yunque in the Luquillo Mountains. Río Grande, Vega Alta, and Vega Baja.

Note: The original description of this taxon by Curtis (1849) was barely validly published, only 2 explicit characters were given for it.

Selected specimens examined: PUERTO RICO: Vega Baja: Laguna Tortuguero, Sep 1960, *Woodbury s.n.* (NY, US); *Liogier & Martorell 34636* (NY); *González-Más & Woodbury 3686* (MAPR); *Liogier & Martorell 34559* (UPR); *Breckon et al. 5804* (US). Río Grande: Sierra de Luquillo, Caribbean National Forest, Roca El Yunque, *Proctor 40814* (US); *Gleason & Cook M-143* (NY); *N.L. Britton & Bruner 7630* (NY).

24. Rhynchospora racemosa C. Wright in Sauvalle, Anales Acad. Ci. Méd. Habana 8: 86. 1871. Type: Cuba. *Wright 727* (holotype: probably at GOET; isotypes: GH!, S, US!).

Rhynchospora polyphylla sensu Grisebach, Cat. Pl. Cub. 246. 1866, non (Vahl) Vahl, 1805.

Rhizomatous perennial, 30-100 cm tall; rhizome short, hardened, nodose, fibrillose; roots medium to somewhat coarse, to 1 mm thick. Culm erect to ascending, borne loosely or tightly crowded together along rhizome, slender, 0.8-2.3 mm wide, often narrowing to 0.5 mm distally, obtusely trigonous proximally, trigonous to triquetrous distally, densely nodose, covered in leaf sheaths much of its length, hardened proximally, firm and flexuous distally, coarsely to finely

ribbed, finely roughened or scabridulous at least distally, smooth proximally, golden brown at nodes proximally, green distally. Leaves 13-40, ascending, spreading, primarily cauline, those at base reduced or represented by sheaths only; sheaths short, herbaceous, finely veined, light brown proximally on basal sheaths, grayish green on cauline sheaths, scaberulous and often appressed to spreading short-pubescent distally (particularly on inner band) to glabrescent, the inner band reddish or yellowish brown with minute shiny dark red or purplish red lineations, muriculate at orifice; ligule essentially absent, but often a thickened band of tissue at adaxial junction of sheath and blade; blades linear, 9-60 cm × 1.3-4 mm, flattened proximally to plicate distally, long-acuminate to triquetrous tip, finely veined abaxially, somewhat glossy and smooth adaxially with indistinct veins, margins and abaxial midvein finely antrorsely serrate-scabrous, grayish green, essentially glabrous, short pilose at base abaxially at junction with sheath. Inflorescence a terminal and series of 3-7 remote, strict, racemose partial panicles from the upper sheathing bracts; sheathing bracts leaf-like proximally to linear setaceous distally on culm, exceeding subtending partial panicles proximally, shorter than to equaling terminal partial panicles; terminal partial panicle largest, 3-7 × 0.6-1 cm, on filiform peduncles 2-6 cm long; spikelets narrowly ellipsoid-lanceoloid, 5.5-8.5 (-9) × 1-1.5 mm at anthesis and early stages of maturity, at later stages of maturity, rachilla elongates up to 20 mm long and is distinctly anfractuose, acuminate at apex, cuneate at base, with 6-7 (-8) scales, subsessile, solitary or in fascicles of 2-3 at branch tips; fertile scales 2-3, ovate-lanceolate to lanceolate, (3-) 3.5-6 (-6.2) × (1.8) 2-2.6 (-2.8) mm, slightly curvate-keeled, dorsally obtuse to subrounded, thinly herbaceous, semi-glossy, stramineous or stramineous-ferrugineous, often sparsely reddish lineolate, glabrous, margins narrowly scarious, often undulate, midcosta fine, inconspicuous, extended beyond acute apex as a 0.4-0.6 mm long antrorsely scabrous mucro. Stamens 2-3, the anthers 2-3 mm long, with triangular-papillate appendage at apex, truncate at base with minute papillae or lobes; style entire or shortly 2-branched at tip. Achene biconvex, subtumid, oblong-obovate, (1.4) 1.5-1.9 × 1-1.3 mm, obtuse or subtruncate at apex, cuneate at base, cellular-cancellate with 15-18 (-20) longitudinal rows of cells on each face, pale brown to brown or brownish black, shiny at maturity; style base oblong-lanceolate, mitriform, (0.8-) 1-1.5 mm long, 0.6-0.8 mm wide at base, compressed or subflattened, with truncate to sub-rounded or acute tip, brittle, pale grayish green; bristles wanting or 2-4, often rudimentary, 1-2 sometimes reaching 2/3 length of achene, subulate, antrorsely barbed, translucent, yellowish or reddish.

General distribution: Greater Antilles.

Distribution in Puerto Rico: On serpentine soils; steep, often rocky, wooded slopes and roadside banks. Maricao, Sabana Grande, and Yauco; known only from the southwestern region.

Selected specimens examined: Puerto Rico: Maricao: Bo. Maricao Afuera, *González-Más* 3363 (MAPR); Rosario to Maricao road, *González-Más 2424* (MAPR); Sabana Grande: Maricao State Forest, *Proctor & McKenzie 43827* (US); Susúa Forest Reserve, *Breckon & Weaver 6471* (MAPR). Yauco: Bo. Susua Alta, *García & Caminero 3145* (MAPR).

25. Rhynchospora radicans subsp. **microcephala** (Bertero ex Spreng.) W.W. Thomas, Mem. New York Bot. Gard. 37: 60. 1984; *Dichromena microcephala* Bertero ex Spreng., Syst. Veg. 1: 202. 1824; *Rhynchospora microcephala* (Bertero ex Spreng.) Kük., Bot. Jahrb. Syst. 75: 311. 1951, non Britton ex Small, 1903. Type: Jamaica. *Bertero s.n.* (holotype: TO; photo at MICH; isotype: MO).

Dichromena radicans sensu Urban, Symb. Antill. 4: 121. 1903; and sensu Britton & P. Wilson, Bot. Porto Rico 5: 99. 1923, non Schlechtendal & Chamisso, 1831.

Caespitose annual or short lived perennial, 10-63 cm tall; roots fine. Culms arching to erect, 0.6-1.7 (-2) mm wide, firm and flexuous, triquetrous to obtusely so, compressed distally, coarsely and finely ribbed, smooth, green, glabrous, often elongating and lopping over to the ground at maturity, the inflorescence heads proliferating. Leaves (2-) 3-4 (-5), ascending, primarily cauline or from sterile shoots, the basal leaves, when present, often with reduced blades or represented by bladeless sheaths; sheaths loose, short to medium in length, finely veined with pale veins, green distally, pale green proximally, glabrous; ligule absent; blades linear, herbaceous, 5-30 cm × 1.4-5 mm, flattened to slightly involute, finely

nerved, distinctly so abaxially, with whitened to pale green nerves, often ciliate marginally at base, green to dark green, essentially smooth, glabrous. Inflorescence a conical to hemispherical head of 3-6 (-7) spikelets at the summit of the culm, 0.8-1.5 cm in diam., the central spikelet largest; involucral bracts (3-) 4-5 (-6), leaf-like, spreading to reflexed, exceeding the inflorescence, ciliate basally along margins, the basal bract longest, 4-15 cm long, 1.5-4.5 mm wide; spikelets 3-6 (-7), ovoid, 7-12 × 2-4.3 mm, acute to acuminate at apex, rounded at base, with ca. 20-30 scales; scales all fertile except for basal scale of spikelet, ovate to ovate-lanceolate, 4.2-5.2 × 1.8-3.6 mm, boat-shaped, dorsally obtuse to rounded, submembranous, margins broadly scarious, whitish or stramineous to pale brown, reddish lineolate, glabrous, the midcosta fine, inconspicuous, pale green, extended beyond the narrowly acute to acuminate apex as a very short mucro. Stamens 3, the anthers 1.3-1.7 mm long, apiculate, truncate at base with minute crystalline papillae or glands; style 2-branched. Achene biconvex, very widely obovate, 0.9-1.2 × 0.8-1.4 mm, broadly rounded at apex, cuneate to widely cuneate or sub-rounded at base, transversely rugulose, stramineous to brownish orange or bony white; style base very shallowly triangular to shallowly lunate, 0.1-0.4 mm long, 0.6-1.2 mm wide at base, brownish to stramineous or greenish; bristles absent.

General distribution: Mexico, Central America, West Indies, western South America, and sporadically to the Guianas and Amapá, Brazil. Recently recorded from Hawaii.

Distribution in Puerto Rico and the Virgin Islands: On clay soils and limestone substrate, in open areas and clearings in wet mountain forest, swampy areas, lawns, roadsides and disturbed habitats. Adjuntas, Añasco, Arecibo, Bayamón, Cabo Rojo, Caguas, Canóvanas, Cayey, Ceiba, Fajardo, Guayama, Hatillo, Jayuya, Juana Díaz, Las Marias, Luquillo, Maricao, Maunabo, Mayagüez, Naguabo, Orocovis, Ponce, Río Grande, San Germán, San Lorenzo, Utuado, Vega Baja, Villalba, and Yabucoa; St. Thomas and Tortola.

Selected specimens examined: Puerto Rico: Adjuntas: Monte Cerrote, near Adjuntas, *N.L. Britton et al. 5393* (NY, US). Añasco: new road #2, *González-Más 1457* (MAPR). Arecibo: Bo. Río Arriba, *Axelrod 7985* (HAC, NY, UPRRP, US). Bayamón: *Johnston & Stevenson 1140* (NY, US). Caguas: Beatriz de Caguas, *Goll 420* (US). Canóvanas: Caribbean National Forest, La Condesa Section, *Axelrod & Schulz 5637* (UPRRP). Cayey: Carite Forest Reserve, *Axelrod & Axelrod 4347* (NY, UPRRP, US). Ceiba: Luquillo Mountains, *Acevedo-Rdgz. et al. 10762* (US). Fajardo: Río Arriba, *N.L. Britton & Shafer 1676* (NY, US). Guayama: Carite Forest Reserve, *Axelrod et al. 1009* (UPRRP). Juana Díaz: Bo. Collores, dirt road from end of Rt. 512, *Axelrod & Sastre 5257* (UPRRP, US). Las Marías: La Juanita, near Las Marías, *N.L. Britton et al. 3896* (NY, US). Luquillo: El Verde Field Station, *Taylor 10130* (NY, UPRRP). Maricao: Fish Hatchery, *González-Más 402* (MAPR, NY). Maunabo: La Pica, road 3, km 106.2, *González-Más 1337* (MAPR, NY). Mayagüez: Las Mesas, near Mayagüez, *Holm 126* (US); Near Las Vegas, *Fredholm 4421* (MAPR). Naguabo: Sierra de Naguabo, Bo. de Maizales, *N.L. Britton & Cowell 2181* (NY, US); Orocovis: Bo. Barros, *Axelrod & Rogowitz 9974* (UPRRP). Pico del Este, Luquillo Mts, *Liogier et al. 33266* (NY). Ponce: On the Adjuntas Road, 8 mi. from Ponce, *Heller 6301* (MO, NY, US). Río Grande: El Verde Research Station, Rt. 186 at the Río Sonadora, *Taylor 11684* (MO), *11798* (MO, UPRRP); El Yunque, *Hioram 363* (NY, US). San Germán: Rosario, *Stevens & Hess 3809* (MAPR).Utuado: Vicinity of Utuado, *N.L. Britton & Cowell 982* (NY). Vega Baja: *Stevens & Hess 2503* (MAPR). Villalba: Toro NegroReserve Forest, *González-Más 2005* (MAPR). Yabucoa: Cuchilla de Panduras, *Axelrod et al. 1367* (UPRRP). St. Thomas: Signal gorges, *Eggers s.n.* (MO). Tortola: Road Town to High Bush, *N.L. Britton & Shafer 769* (US); Sage Mountain, *D'Arcy 758* (MO).

26. Rhynchospora rariflora (Michx.) Elliott, Sketch Bot. S. Carolina 1: 58. 1816; *Schoenus rariflorus* Michx., Fl. Bor.-Amer. 1: 35. 1803; *Rhynchospora micrantha* Vahl, Enum Pl. 2: 231. 1805, *nom. illeg.* Type: United States; Georgia. *Michaux s.n.* (holotype: P, photo at GH; isotype fragment: NY).

Rhynchospora setacea Vahl, Enum. Pl. 2: 233. 1805. Type: South America. Collector unknown (holotype: C-Vahl).

Caespitose perennial, (15-) 20-72 cm tall; rhizomes slender and knotty, stiff, often forming

a dense mass or sometimes short horizontally creeping; roots medium, to 0.7 mm thick. Culms ascending or reclining, 0.3-0.8 (-1) mm wide, trigonous with blunt angles or subterete, wiry, flexible, delicate, finely ribbed, smooth except for antrorsely scabrous margins of channel distally, green, glabrous. Leaves numerous, ascending, basal; sheaths short, the lowermost bladeless or nearly so, herbaceous, finely veined, stramineous proximally, pale brown or green distally, glabrous, the inner band brown with minute blackish spots at orifice; ligule absent; blades filiform, 4-40 cm × 0.2-1 mm (flattened), often curving or wavy with age, grading from involute to subterete and canaliculate, long-attenuate to triquetrous antrorsely scabrous apex, finely veined abaxially, finely cellular-reticulate adaxially, smooth, margins scabrous (at least distally), green, glabrous. Inflorescence a terminal and 1-2 lateral, remote, small, open, corymbiform panicles of 2-13 (-23) spikelets from the upper sheathing bracts, 1-5 × 1-2 (-3) mm, the capillary branchlets elongating, ascending to spreading, with solitary spikelets terminating branch tips; spikelets ovoid to broadly ovoid or ovoid-ellipsoid, 3.5-4.5 (-5) × 1.5-1.8 mm, acute at apex, shortly attenuate at base, with 5-8 scales; fertile scales 3-5, ovate to rounded-ovate, 2-3.7 (-4) × 1.9-3.2 (-3.5) mm, curvate-keeled, dorsally obtuse, thinly herbaceous, finely cellular-striate, semi-glossy, light to dark brown, often blackish brown-lineolate on sides, margins narrowly scarious, often undulate, midcosta very fine, indistinct, extending beyond acute to obtuse apex as a short mucro. Stamens 3, the anthers 1.5-2.5 mm long, apiculate, truncate at base with minute papillae or lobes; style 2-branched. Achene biconvex, obovate to oblong-obovate, (1.3-) 1.4-1.7 × (1.0-) 1.1-1.4 mm, rounded to truncate apex, short attenuate at base, transversely rugulose, cellular oblong-cancellate between the rugae, two small whitish ascending tongues of spongy tissue prominent on either side at the base, light or dark brown, dark reddish brown at base; style base deltate, 0.4-0.7 mm long, 0.7-1 mm wide at base, flattened, brittle, brown, often with a crusty whitened surface; bristles 5-6, subulate, antrorsely barbed, setose at base, reddish brown, unequal in length, the longest equaling or only slightly exceeding middle of achene.

General distribution: Eastern and southeastern United States west to Texas, Central America, and the Greater Antilles.

Distribution in Puerto Rico: On wet to moist white silica sand in open areas, Dorado and Laguna Tortuguero. Dorado and Vega Baja.

Selected specimens examined: PUERTO RICO: Dorado: 3 Dec 1960, *Woodbury s.n.* (NY). Vega Baja: Tortuguero, 17 May 1960, *Woodbury s.n.* (NY, US).

27. Rhynchospora recognita (Gale) Kral, Novon 9: 205. 1999; *Rhynchospora globularis* var. *recognita* Gale, Rhodora 46: 245. 1944. Type: United States; Virginia. *Fernald & Long 6070* (holotype: GH; isotypes: P, PH, US!).

Schoenus cymosus Muhl., Descr. Gram. 8. 1817, non Willdenow, 1797.

Rhynchospora cymosa sensu Torrey, Fl. N. Middle United States 1: 56. 1823; sensu Urban, Symb. Antill. 4: 124. 1903, and many authors thereafter, non Elliott, 1816.

Caespitose perennial, in small clumps, 10-102 cm tall; rhizome short, inconspicuous. Culms stiffly erect, firm to subhardened, slender, trigonous, obtusely trigonous, or subterete, smooth, finely ribbed, green, glabrous, minute whitish punctations often evident on culms and leaves. Leaves numerous, ascending, primarily basal, 3-5 cauline, the blades of basal leaves often curling; sheaths short, herbaceous to thickly herbaceous, finely veined, green to pale green or stramineous, glabrous; ligule absent; blades narrowly linear, 3-36 cm × 1-4.5 mm, flattened to V-shaped or subplicate, finely veined abaxially, smooth, semi-glossy and finely cellular-reticulate adaxially, attenuate to triquetrous apex, margins and abaxial midvein essentially smooth proximally, antrorsely scabrous distally, green, glabrous. Inflorescence a terminal and series of 1-3 remote lateral corymbose panicles of spikelets from the upper sheathing bracts; terminal panicle 1-6 × 1-3 cm, the smaller lateral panicles remote, the lowermost on long slender peduncles, the spikelets in fascicles at branch tips; spikelets broadly ovoid, 3-4 × 1.5-2 mm, acute at apex, acute to obtuse at base, with 5-6 scales; fertile scales 2-3, ovate to subrounded, deeply boat-shaped, 1.8-3 × 2-3.2 mm (flattened), curvate-keeled, dorsally obtuse to subrounded, thinly herbaceous, finely cellular-striate, dull, brown, often tinged with dark brown or brown-black on sides, margins scarious, erose, midcosta slender, pale brown, extending

beyond obtuse to subemarginate apex of scale as a short mucro. Stamens 3, the anthers 0.5-2 mm long, apiculate, truncate with minute glands or papillae at base; style 2-branched. Achene thickly biconvex, broadly obovoid to subglobose, 1.3-1.8 × 1.2-1.5 mm, rounded at apex, acute to subobtuse and very short-stipitate at base, transversely rugulose, yellow-brown to dark brown; style base depressed-conical to triangular, 0.3-0.8 mm long, 0.6-0.9 mm wide at base, subflattened, abruptly flaring to an elliptic base as seen from above, brittle, light brown to brown; bristles 5-6, subulate, antrorsely barbed, reddish, extending ½ to ⅔ length of achene body.

General distribution: North central and southeastern United States west to Texas and California, Mexico (Chiapas), Central America, and the West Indies.

Distribution in Puerto Rico: Occurs on red laterite soils or silica sand deposits; savannas, grassy hillsides, slopes, fields, and seepage areas at lower and middle elevations. Barranquitas, Maricao, Mayagüez, Patillas, Río Grande, San Juan, Vega Baja, and Yabucoa.

Selected specimens examined: Puerto Rico: Barranquitas: Monte Torrecilla, *N.L. Britton et al. 5646* (NY, US). Maricao: Bosque de Maricao, *González-Más 3864* (MAPR). Mayagüez : Cerro Las Mesas, *N.L. Britton & Hess 2717* (NY, US); Cerro de Las Mesas, *Hess & Stevens 3852* (NY); Las Mesas, *Holm 82a* (US), *317* (NY); *Liogier et al. 30529* (NY). Río Grande: Rd. to East Peak, *Woodbury s.n.* (UPR). San Juan: Santurce, *Heller & Heller 13* (NY, US). Vega Baja: Tortuguero (east), 15 May 1977, *Woodbury s.n.* (NY, UPR). Yabucoa: Guayanes, *Woodbury s.n.* (NY, UPR).

28. Rhynchospora rugosa (Vahl) Gale, Rhodora 46: 275. 1944; *Schoenus rugosus* Vahl, Eclog. Amer. 2: 5. 1798; *Rhynchospora glauca* Vahl, Enum. Pl. 2: 233. 1805, *nom. illeg.* Type: South America; Boca Chica no.27. *Rohr s.n.* (holotype: C-Vahl, photo at F, US).

Caespitose perennial, 27-135 (-140) cm tall; rhizome short, knotty; roots coarse. Culms erect, (0.8-) 1.2-2.5 (-3) mm wide, trigonous to obtusely trigonous, very firm, finely ribbed and channeled, smooth, green, glabrous. Leaves 5-15, ascending, primarily basal, 2-5 cauline; sheaths short, finely ribbed abaxially, smooth, green, glabrous; ligule absent; blades , 9-55 cm × (1.3-) 1.7-4.5 (-5) mm, flattened to subplicate or folded, smooth, green, glabrous, margins and abaxial midvein smooth proximally to minutely antrorsely scabrous distally, long-acuminate to triquetrous apex. Inflorescence a terminal and series of 1-2 lateral remote cymose-paniculate partial panicles from the upper sheathing bracts; panicles narrowly obtriangular, 1-8 (-11) × 0.8-2.7 (-3.5) cm, the spikelets in fascicles at branch tips; spikelets ovoid-ellipsoid, 3.5-4.7 (-5) × 1.1-1.7 mm, acute at apex, short-cuneate at base, with 6-9 scales; fertile scales 3-5, spreading with developing achenes, ovate to oblong-ovate, (2.3-) 2.5-3.5 × 1.8-2.8 mm, thinly herbaceous, dorsally obtuse to subrounded, finely cellular-striate, brown to dark brown or brownish black, glabrous, finely and indistinctly veined, margins broadly scarious, often erose, midcosta narrow, pale brown, extending beyond the acuminate apex as a 0.1-0.5 mm long mucro. Stamens 3, the anthers 0.6-1.7 mm long, apiculate; style 2-branched. Achene biconvex, obovate to elliptic-obovate, 1.6-1.9 × 1-1.3 mm, cuneate at base, truncate at apex, transversely rugulose, light brown or yellowish brown; style base triangular, 0.6-1 mm long, 0.6-0.8 (-1) mm wide at base, ca. 2/3 as wide as achene, minutely antrorsely scabrous along margin, pale brown to dark brown; bristles 6, antrorsely barbed, equaling to exceeding apex of style base, often setose at base.

General distribution: Mexico, Central America, West Indies, and tropical South America.

Distribution in Puerto Rico: Occurs in wet to moist, rich laterite soils, red clays, or silica sand deposits, in savannas, thickets, pastures, open places, mountain slopes, along streams, and steep exposed roadside banks. Aguada, Bayamón, Cataño, Ceiba, Cidra, Lares, Las Piedras, Luquillo, Manatí, Mayagüez, Moca, Naguabo, Río Grande, San Juan, San Sebastián, and Vega Baja.

Selected specimens examined: Puerto Rico: Aguada: *Sintenis 5742* (US). Cataño: back of Cataño, *Heller 6410* (MO, NY, US). Cidra: *Perkins s.n.* (NY). Lares: *Sintenis 5901* (MO, NY, US). Luquillo: Pico del Este, Mts., *Liogier et al. 33284* (NY). Mayagüez: Las Mesas, *Holm s.n.* (US); *Liogier et al. 30539, 30691* (NY). Moca: road 110, km 9.2, *González-Más 1808* (MAPR, NY, US). Naguabo: Sierra de Naguabo, Río Icaco and adjacent hills, *Shafer 2534* (NY, US). Naguabo/

Río Grande: Caribbean National Forest, along 1 km stretch of Tradewinds Trail, *Axelrod 6913* (UPRRP, US), *6915* (NY, UPRRP). San Juan: Road from Río Piedras to Trujillo Alto, *Hioram 806* (NY, US). San Sebastián: *Sargent 213* (US). Vega Baja: Tortuguero, *González-Más 4016* (MAPR).

29. Rhynchospora tenerrima Nees ex Spreng., Syst. Veg. 4 (Curae posteriores): 26. 1827. Type: West Indies. "Nov. Holl." [an error for West Indies], *Kohaut s.n.*, distributed as *F. Sieber agrost. no. 116* (holotype: AWH).

Schoenus setaceus P. J. Bergius, Acta Helv. Phys.-Math. 7: 130. 1772; *Rhynchospora setacea* (P. J. Bergius) Boeck., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1869: 159. 1869, non Vahl, 1805. Type: Surinam. *Rolander s.n.* (C-Rottb).

Scleria setacea Poir. in Lamarck, Encycl. 7: 4. 1806. Type: Puerto Rico. *Ledrú s.n.* (holotype: probably at P).

Caespitose annual, 7-55 cm long; roots fine to medium. Culms ascending, 0.3-0.8 mm wide, obtusely trigonous, soft, flexuous, finely ribbed, minutely punctate distally, green, glabrous. Leaves numerous, ascending, primarily basal, 1-3 cauline; sheaths short, scarcely inflated, herbaceous, finely veined, pale brown, glabrous; ligule absent; blades filiform, 3-36 cm × 0.3-1.3 (-1.4) mm, crescentform-involute proximally, triangular-channeled distally, herbaceous, finely veined, minutely punctate, (at least distally), pale green, glabrous, margins essentially smooth proximally, antrorsely scabrous at apex, long-attenuate to triquetrous or subflattened apex. Inflorescence a terminal and 1-3 lateral, small, contracted, corymbose partial panicles from the upper sheathing bracts; terminal panicle 7-15 × 4-14 mm, the spikelets (1-) 2-10, rather congested; spikelets narrowly ovoid-ellipsoid to ellipsoid-lanceoloid, 5-6 × 0.9-1.8 mm, acuminate at apex, cuneate at base, with 5-11 scales; fertile scales 3-6, ovate-elliptic to ovate-lanceolate, (2.7-) 3-4.8 (-5) × 1-2.8 mm, obtusely angled dorsally, becoming sub-rounded with developing achenes, sterile and lower fertile scales thinly coriaceous, glabrous, glossy, somewhat uniformly light brown to brown, with darker reddish brown lineations, upper fertile scales submembranous, dull, margins broadly scarious with reddish lineations, midcosta very fine, pale, extending beyond acute to acuminate apex of scale as a 0.5-1 mm long antrorsely scabrous awn, lateral nerves indistinct. Stamens 2, the anthers 1-1.6 mm long, apiculate, truncate with minute crystalline protuberances at base; style 2-branched. Achene biconvex, obovate, 1.5-1.8 × 1.1-1.5 mm, margins at apex flaring, prolonged into an ear-like projection on each side that is confluent with margins of style base, abruptly narrowing to a narrow, whitish translucent, cellular-reticulate stipe at base, transversely rugose medially, widely cellular-reticulate-papillate on margins, pale brown to brown, often with a gray or reddish longitudinal stripe medially; style base tounge-like, dialated at the tip as seen from dorsal or front view, pyramidal as seen from lateral view, the edges decurrent along edges of apical ears of achene, 0.4-0.6 mm long, 0.2-0.3 mm wide at base, soft, brittle, brown to brownish black; bristles absent.

General distribution: Mexico (Chiapas, Tabasco), Central America, West Indies, and tropical South America.

Distribution in Puerto Rico: In wet to moist sandy soils of open fields, pastures, open savanna, marshy or swampy areas, hillside seepage bogs, coastal swamps, and roadside banks and ditches at lower and middle elevations. Cabo Rojo, Cataño, Cayey, Dorado, Fajardo, Guayama, Humacao, Lares, Las Piedras, Manatí, Patillas, Río Grande, San Lorenzo, San Sebastián, Manatí, Mayagüez, Río Grande, San Juan, Vega Alta, Vega Baja, and Yabucoa.

Selected specimens examined: PUERTO RICO: Cabo Rojo: Punta Arena, *González-Más 2146* (MAPR, NY, US). Cataño: Vicinity of Cataño, *N.L. Britton et al. 6971* (NY). Cayey: Road 184, Guavate-Carite, km 2, *González-Más 1570* (MAPR, NY, US); Cerro La Santa, Guavate, *Liogier et al. 29813* (NY). Dorado: Dorado to Cerro Gordo, Rt. 693, km 13, *González-Más 307* (MAPR, NY, US). Guayama-Patillas: Carite Forest Reserve, *Axelrod & Alemán 9893* (UPRRP). Humacao: Punta Santiago, *Liogier & Oquendo 254* (UPR). Lares: *Stevens & Hess 4942* (NY). Manatí: Bo. Tierras Nuevas Saliente, *Proctor & Concepción 42201* (US). Mayagüez : Las Mesas, *Holm 73* (MO); Guanajibo, near Mayagüez, *N.L. Britton & Cowell 4075* (NY, US). Patillas: edge or Carite Reserve, *Taylor 8230* (UPRRP). Río Grande: Río Espíritu Santo, Coco Beach, *Liogier*

et al. 33785 (NY); El Yunque, *Fosberg 44199* (US). San Juan: Santurce. *Heller & Heller 599* (NY, US). San Lorenzo: Guayabota, from San Lorenzo to Patilla, *Liogier & Martorell 34329* (MO, NY). San Lorenzo-Yabucoa border: *Taylor 7601* (NY). San Sebastián: Bo. Eneas, *González-Más 924* (MAPR, NY, US). Vega Alta: Bo. Sabana, *Proctor & Thomas 44147* (US). Vega Baja: Tortuguero Lagoon, *González-Más 1051* (NY, US); *Liogier & Martorell 34613, 34624* (NY). Yabucoa: *Sintenis 5168* (US); Cerro de Pandura, Santa Elena, *Liogier et al. 30991* (NY).

30. Rhynchospora uniflora Boeck., Flora 63: 439. 1880. Type: Brazil; Rio de Janiero. *Glaziou 9336* (holotype: B, destroyed).

Rhynchospora elongata Boeck., Beitr. Cyper. 1: 26. 1888. Type: Puerto Rico. *Sintenis 1360* (isotype: S).

Rhizomatous perennial forming dense clumps, (20-) 30-110 cm tall; rhizome short, nodose, woody; roots medium to coarse, 0.5-1.5 mm thick. Culm erect, 0.7-1.5 (-2) mm wide, obtusely trigonous proximally to trigonous distally, stiff, internally soft and pithy, often hollow proximally, finely ribbed, essentially smooth, often antrorsely scabrous on angles distally, tan or light yellowish brown proximally and often with patches of brown at nodes, green distally, very finely and sparsely antrorsely setose-scabrous, glabrescent. Leaves numerous, ascending, dense, primarily cauline, the lower cauline blades often reduced, the mid to upper cauline elongate; sheaths elongate, herbaceous, finely veined, pale green or brown, very finely and sparsely antrorsely setose-scabrous near orifice, glabrous proximally; ligule a very fine thickened band of tissue at adaxial junction of sheath and blade; blades narrowly linear, 10-40 (-50) cm × (0.8-) 1-2.5 (-3) mm, flattened to plicate, long-attenuate to triquetrous apex, acute to acuminate at apex on reduced lower cauline blades, finely veined abaxially with a pale distinct midcosta and two lateral costa, finely veined adaxially, margins and abaxial midcostae finely and closely antrorsely appressed setose-scabrous (at least distally), bluish or grayish green, minutely pale green or whitish punctate, very finely and sparsely antrorsely setose-scabrous or glabrous. Inflorescence a terminal and series of 1-5 lateral, often remote, small, simple to compound, fasciculate or loosely corymbose-fasciculate partial panicles from the upper sheathing bracts; terminal partial panicle a single fascicle or compound corymb of 2-5 fascicles of spikelets, 1-5 × 1-2 cm, with 10-60 spikelets, the lateral smaller, on very slender peduncles to 5 cm long or sometimes very short peduncled and appearing sessile; spikelets lanceoloid to oblong-lanceoloid, 4-6 × 0.7-1.3 mm, acuminate at apex, acute to obtuse at base, with 6-8 scales, widely spreading with developing achenes; fertile scales 4-6, 1-3 bisexual, 1-2 terminal scales of spikelet staminate only, ovate-lanceolate to lanceolate, 3-5 × 0.8-1.5 mm, shallowly boat-shaped, slightly curvate, dorsally obtuse to rounded, thinly herbaceous, glossy, pale reddish brown or brownish yellow, finely ferrugineous or brownish lineolate, margins entire, escarious, midcosta fine, pale green, extended beyond acute to acuminate apex as a short mucro. Stamens 3, the anthers 2-3 mm long, glandular-apiculate, truncate at base with minute papillae of glands; style entire or shortly 2-branched at apex. Achene biconvex, obovate, elliptic obovate, or rounded-obovate, 1.5-2.2 × 0.9-1.6 mm, rounded at apex, obtusely narrowed to short-stipitate base, finely transversely rugulose to faintly so and appearing smooth, light brown to chestnut colored, dull to subglossy; style base conic-subulate, 1-1.5 mm long, 0.4-0.6 mm wide at base, brittle, crustose, grayish green, often purple-dotted; bristles absent.

General distribution: Greater Antilles, Venezuela, and southern Brazil.

Distribution in Puerto Rico: Known only from mountain summits in the Naguabo and Luquillo Mountains. Naguabo and Río Grande.

Note: Kükenthal (1949) treated *R. uniflora* and *R. elongata* as separate taxa based on length of culms (20-70 cm tall vs. 45-100 cm tall respectfully); width of the leaves (0.5-1.5 mm wide vs. 1.5-2 mm wide respectfully); number of flowers in the spikelets (1-2 vs. 3 respectfully); width of the style base in relation to that of the achene (½ vs. ⅔ respectfully); and achene surface (indistinctly transversely rugulose vs. distinctly transversely rugulose respectfully). We have not found these characters to be consistent in any set of specimens studied over the entire range of this plant, nor have we found any other characters to support separation of the two taxa as circumscribed by Kükenthal.

Selected specimens examined: PUERTO RICO: Naguabo: Sierra de Naguabo, El Yunque, NW, *Shafer 3661* (NY, US). Río Grande: Luquillo Forest, summit of El Yunque, *González-Más & Brown 2364* (MAPR); *González-Más & Woodbury 3454* (MAPR); Sierra de Luquillo, *Sintenis 1356* (US).

31. Rhynchospora velutina (Kunth) Boeck., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1869: 149. 1869; *Dichromena velutina* Kunth, Enum. Pl. 2: 282. 1837; *Psilocarya velutina* (Kunth) Nees in Martius Fl. Bras. 2(1): 115. 1842. Type: Brazil. *Sello s.n.* (holotype: B, destroyed).

Psilocarya rufa Nees in Martius, Fl. Bras. 2(1): 117. 1842; *Rhynchospora rufa* (Nees) Boeck., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1869: 149. 1869. Type: Guyana. *Schomburgk 667* (lectotype: US!, isolectotype: BM, G, K), here designated.

Rhizomatous perennial, 66-174 cm long; rhizome short, stout and thickened, hardened; roots coarse, 1-2 mm thick. Culm erect to ascending, 1-4.6 mm wide, widest at base, often rooting at 1-2 nodes just above base, trigonous with blunt angles to obtusely trigonous, firm, not hardened, finely ribbed, essentially smooth, green, often with pale green ribs, glabrous or with a few trichomes proximally. Leaves 6-11, ascending, basal and cauline, those at very base often with very short blades or blades absent; sheaths medium length, soft, herbaceous, closely and finely veined with pale green veins, light green or pale brown proximally, green distally, hirsute to glabrescent; ligule absent; blades narrowly linear, 10-90 cm × 1.5-5 (-6) mm, flattened to plicate, herbaceous, finely veined, green and pilose to glabrescent abaxially, sometimes pilose proximally, the adaxial surface rugose or warty to somewhat smooth or roughened, glossy, green to whitish, finely cellular-reticulate with white crystals evident in some cells, glabrous, margins smooth to scabrous distally, long-attenuate to triquetrous apex. Inflorescence a terminal and series or 1-3 (-4) lateral corymbose partial panicles from the upper sheathing bracts, reduced in size proximally; terminal panicle 2.5-15 × 11 cm, with 17-190 spikelets, central axis triquetrous, long-ciliate on angles, sheathing bracts and panicle bractlets often long-ciliate on margins; spikelets ovoid-ellipsoid, 5.5-7 (-9) × (1.3-) 1.5-2.5 mm, acute to acuminate at apex, acute to obtuse at base, with 12-23 scales; fertile scales 9-18, widely ovate or widely ovate-deltate to widely ovate-lanceolate, ovate-lanceolate, or lanceolate (apical scales), 3.2-6.2 × 1.4-3.5 mm, obtuse to sub-rounded dorsally, thinly herbaceous to submembranous, finely cellular-striate, uniformly reddish or yellowish brown, often with dark brown lineations medially on sides, glabrous, margins widely scarious, entire, slightly undulate, midcosta very fine, inconspicuous, often setose at apex, extending beyond apex as a short slightly recurved awn, lateral nerves indistinct, acute at apex, the apex of distal spikelet scales often recurved. Stamens 3, the anthers 2-3.5 mm long, with an elongate papillate appendage at apex, truncate at base with minute lobes or papillae; style 2-branched. Achene biconvex, at maturity often falcate in longitudinal section, obovate or obovate-deltate, 1.5-1.7 × 1.3-1.6 mm, truncate at apex, cuneate at base, transversely rugulose-papillate, with cellular-reticulate-papillate margins, brown, yellowish brown, or dark brown; style base triangular to triangular-lanceolate, 0.8-1.2 mm long, 1.2-1.4 mm wide at base (nearly as wide as achene at base), 2-lobed at base, the lobes overlapping apex of achene, brittle, crustose, pale brown to light brown; bristles absent.

General distribution: Mexico, Central America, Greater Antilles, and tropical South America.

Distribution in Puerto Rico: Historically, known only from Martín Penã marsh and Río Piedras in San Juan.

Selected specimens examined: PUERTO RICO: San Juan: Martín Peña, *Johnston 842* (NY); Río Piedras, *Johnston & Stevenson 1883* (NY, US).

32. Rhynchospora wrightiana Boeck., Flora 64: 78. 1881; *Rhynchospora gracillima* C. Wright in Sauvalle, Anales Acad. Ci. Méd. Habana, 8: 85. 1871, non Thwaites 1864; *Rhynchospora distans* var. λ. *gracillima* Kük., Repert. Spec. Nov. Regni Veg. 23: 208. 1926. Type: Cuba. *Wright 3781* (holotype: GH; isotypes: NY!, US!).

Rhynchospora distans var. *tenuis* Britton, Trans. New York Acad. Sci. 11: 90. 1892. Type: United States; Georgia. *Cutler s.n.* (holotype: probably at PH).

Rhynchospora pallida sensu C. B. Clarke in Urban, Symb. Antill. 2: 126. 1900, pro parte, non M.A. Curtis, 1849.

Rhynchospora brachychaeta sensu Small, Fl. s.e. U.S. 196. 1903, non C. Wright, 1871.

Densely caespitose perennial, (8-) 14-56 (-65) cm tall; rhizome short, inconspicuous; roots fine to medium, less than 1 mm thick. Culms erect to ascending, 0.3-1.7 mm wide, wiry, trigonous to obtusely trigonous or subterete, firm but flexible, finely ribbed, smooth, green, glabrous. Leaves numerous, ascending to loosely spreading, basal and cauline, reduced distally on culm; sheaths short, herbaceous, finely veined, pale brown to light reddish brown, glabrous; ligule absent; blades V-shaped, folded, or involute proximally, triangular-channeled distally, 3-30 (-35) cm × 0.2-1.3 (-2) mm, often curving or wavy at maturity, attenuate to triquetrous apex, finely veined abaxially, finely cellular-reticulate adaxially, essentially smooth, antrorsely scabrous distally on margins, bluish green adaxially, otherwise green, glabrous. Inflorescence a terminal and series of 1 or rarely 2 lateral fascicles of spikelets from the upper sheathing bracts; fascicles 4-10 × 3-10 mm, the smaller lateral fascicles on short, slender erect to ascending peduncles; spikelets ovoid, (2.6-) 3-3.5 (-4) × 0.8-1.5 mm, acute at apex, cuneate at base, with 5-7 scales; fertile scales 2-3, rounded-ovate or rounded-obovate, 2-2.8 × 2-2.8 mm, curvate-keeled, deeply boat-shaped, dorsally obtuse to rounded or broadly rounded, thinly herbaceous, finely cellular-striate, semi-glossy, dark brown, margins essentially escarious or narrowly so, inrolled around flower at anthesis, midcosta fine, pale brown, extended beyond slightly recurved obtuse or acute to acuminate apex as a mucro or short awn. Stamen 1, the anthers 0.7-1.3 mm long, apiculate, truncate at base with minute papillae or glands; style 2-branched. Achene biconvex, elliptic, 1.5-1.8 × 1.1-1.4 mm, truncate at apex, short-cuneate at base, faintly transversely rugulose or nearly smooth, dark brown to brownish black with a distinct or indistinct somewhat paler brown or reddish area medially; style base triangular, subcompressed, 0.5-0.9 mm long, 0.7-0.9 mm wide at base, flattened with a broad bill-like extension at tip and narrowly elliptic swollen rim at base (as seen from above), light brown, often with crusty whitish surface; bristles 6, subulate, antrorsely barbed, reddish, variable in length, rarely exceeding the achene.

General distribution: Southeastern United States west to Texas and the Greater Antilles.

Distribution in Puerto Rico: Historically known only from mountain summits in the Sierra de Luquillo Mountains, collected in 1960 by R. O. Woodbury at Laguna Tortuguero. Known from the municipalities of Ceiba, Dorado, Río Grande, and Vega Baja.

Selected specimens examined: PUERTO RICO: Vega Baja: Tortuguero, 12 March 1960 *Woodbury s.n.* (UPR); Sep 1969, *Woodbury s.n.* (NY). Río Grande: Luquillo Mountains, *Wilson 97* (NY, US); Sierra de Luquillo, in monte Jimenes, *Sintenis 1381* (NY, US).

Excluded species

Rhynchospora divergens Chapm. ex M.A. Curtis, Amer. J. Sci. Arts, ser. 2, 7: 409. 1849. Cited by Urban (1903) based on the collection *Blauner 247*, the type of *Rhynchospora blauneri* Britton which is a synonym of *Rhynchospora brachychaeta* C. Wright. Also cited for Laguna Tortuguero by Liogier & Martorell (1982: 218; 2000: 243). However, no specimens have been found to substantiate this record.

Rhynchospora longiflora C. Presl in Oken, Isis 21: 269. 1828. Cited for Puerto Rico by Liogier & Martorell (1982: 218; 2000: 244), but no specimens have been found to confirm this record nor has it been recently collected.

Rhynchospora macra (C. B. Clarke ex Britton) Small, Man. S. E. Fl., 180. 1933. Erroneously cited by Thomas (Brittonia 44: 27. 1992) as occurring in Puerto Rico (Thomas, pers. comm. 1999).

Rhynchospora miliacea (Lam.) A. Gray, Ann. Lyceum Nat. Hist. New York 3: 198. 1835. Reported from Puerto Rico by Schultes, but no specimens were found to substantiate this record nor has it been seen or collected since (see Britton & P. Wilson, 1923).

Rhynchospora nervosa (Vahl) Boeck., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn ser. 3, 1: 143. 1868. Erroneously cited by

Thomas (Brittonia 44: 22. 1992) for Puerto Rico based on the type he listed for *Dichromena persooniana* Nees. The type listing of this name by Nees is a combination of localities for synonyms he cited under this taxon which included *Dichromena ciliata* Pers. (Florida, Caribbean islands) and *Schoenus ciliatus* G. Mey. (Essequebo, Guyana).

Rhynchospora oligantha A. Gray, Ann. Lyceum Nat. Hist. New York 3: 212. 1835. Cited for Puerto Rico by Liogier & Martorell (1982: 219; 2000: 244), but no specimens were found to confirm this record nor has it been recently collected. Specimens of *Rhynchospora breviseta* (Gale) Channell at the UPR herbarium have been misidentified as this species.

Rhynchospora pedersenii Guagl., Darwiniana 39: 321. 2001. Based on *Rhynchospora gigantea* var. *latifolia* H. Pfeiff., Repert. Spec. Nov. Regni Veg. 17: 236. 1921. Guaglianone (2001) cites a specimen from Puerto Rico (*Otero 537*, MO!) as this taxon. However, this specimen does not show the characteristics described for this taxon. It is glabrous throughout, the peduncles of the lateral inflorescence panicles are exserted above the sheath of their subtending bracts, and is otherwise characteristic of typical *R. corymbosa*. *Rhynchospora gigantea* var. *latifolia* was described as a somewhat hairy plant having puberulent culms and tomentose or pilose sheaths and proximal leaf blades. Perhaps the mold hyphae evident on the *Otero* specimen were mistaken for tomentose hairs by the author.

Rhynchospora perplexa Britton in Small, Fl. s.e. U.S. 197. 1328. 1903. Reported for Puerto Rico by Kartesz (1998) in "A Synonymized Checklist of the Vascular Flora of the United States, Puerto Rico, and the Virgin Islands" (http://www.csdl.tamu.edu/FLORA/b98/check98.htm). However, no specimen record exists (Kartesz, pers. comm., 2001).

Rhynchospora pinetorum Britton & Small in Small, Fl. s.e. U.S. 183, 1503. 1903. (*Rhynchospora globularis* var. *pinetorum* (Britton & Small) Gale). Cited for Puerto Rico by Liogier & Martorell (1982: 218; 2000: 243), but no specimens were found to confirm this record nor has it been recently collected. Specimens of *Rhynchospora recognita* (Gale) Kral (*Rhynchospora globularis* var. *recognita* Gale) in the UPR herbarium have been misidentified as this species.

Rhynchospora sola Gale, Rhodora 46: 162. 1944. Reported for Puerto Rico by Kartesz (1998) in "A Synonymized Checklist of the Vascular Flora of the United States, Puerto Rico, and the Virgin Islands" (http://www.csdl.tamu.edu/FLORA/b98/check98.htm). However, no specimen record exists (Kartesz, pers. comm., 2001).

Rhynchospora tenuis Willd. ex Link, Jahrb. Gewächsk. 1(3): 76. 1820. Specimens of *Rhynchospora depressirostris* have previously been treated as this.

15. SCHOENOPLECTUS

Schoenoplectus (Rchb.) Palla, Verh. K. K. Zool.-Bot. Ges. Wien 38 (Sitzungsber.): 49. 1888, *nom. conserv.*

Emergent aquatics; perennials or annuals, with elongate, horizontal rhizomes or tufted. Culms trigonous or terete, glabrous, air cavities often present. Leaves well-developed or reduced to short protrusions from the bladeless sheaths; ligule present or absent. Inflorescences congested and head-like or anthelate with elongate rays, terminal, often appearing lateral (pseudolateral); involucral bracts 1-2 (-3), the lowest appearing as a continuation of the culm, or (1-) 2-6, flattened and leaf-like; rays with tubular prophylls at base; spikelets ovoid, ellipsoid or cylindrical. Flowers bisexual; bristles 0-6, when present strap- or needle-like, retrorsely barbed with straight or recurved barbs; stamens 2-3, the anthers with prickly or barbed appendage at apex, sagittate at base; style 2- or 3-branched, sub-flattened to strap like. Achene plano-convex, trigonous or lenticular, smooth or transversely rugulose, brown or blackish

at maturity. Widely distributed, primarily in North America, Asia, and Africa with approximately 80 species.

TYPE: *Schoenoplectus lacustris* (L.) Palla (≡ *Scirpus lacustris* L.).

References: Strong, M.T. 1994. Taxonomy of *Scirpus, Trichophorum,* and *Schoenoplectus* (Cyperaceae) in Virginia. Bartonia 58: 29-68. Strong, M.T. 1998. *Schoenoplectus*. Pp. 639-640. *In*: D.M. Kearns et al., Cyperaceae, Flora of the Venezuelan Guayana. Vol. 4, Caesalpiniaceae-Ericaceae, eds. P.E. Berry, B.K. Holst, and K. Yatskievych, Missouri Botanical Garden Press, St. Louis, MO.

Key to the species of *Schoenoplectus*

1. Inflorescence simple; spikelets sessile in a single glomerate cluster ..... 1. *S. americanus*
1. Inflorescence compound, with elongate branches; spikelets solitary or in small glomerules of 2-4 at branch tips ..... 2. *S. validus*

1. Schoenoplectus americanus (Pers.) Volkart ex Schinz & R. Keller, Fl. Schweiz. ed. 2, 1: 75. 1905; *Scirpus americanus* Pers., Syn. Pl. 1: 68. 1805. Type: United States; South Carolina. *Michaux. s.n.* (holotype: P).

Scirpus olneyi A. Gray ex Engelm. & A. Gray, Boston J. Nat. Hist. 5: 238. 1845; *Schoenoplectus olneyi* (A. Gray ex Engelm. & A. Gray) Palla, Bot. Jahrb. Syst. 10: 299. 1888. Type: United States; Rhode Island. *Olney s.n.* (holotype: GH; isotypes: NY, S).

Emergent, rhizomatous perennial, 30-200 cm tall; rhizomes horizontally creeping, elongate, 3.5-5 mm thick, reddish. Culms erect, sharply trigonous, wing-angled, with deeply concave sides, red to red-tinged near base, 3-10 mm wide. Leaves 1-2, blade-bearing, or the lower bladeless, confined to basal portion of culm; sheaths cross-veined, the inner band firm with a U- or V-shaped notch at orifice; ligule short, ca. 1 mm long at adaxial junction of sheath and blade; blades cross-veined, 1-15 × 1-4 mm. Inflorescence pseudolateral with a single glomerate cluster of (3-) 5-12 spikelets; involucral bract 1, lance-triangular, obtuse to subacute, 1-2 (-3.5) cm long, appearing as a continuation of the culm, glabrous; spikelets ovoid, narrowly ovoid or ellipsoid, obtuse to subacute at apex, 5-10 (-20) × 4-7 mm; scales broadly ovate to orbicular, 2.5-3.2 × 2-2.5 mm, light brown to reddish brown, scarious-margined, the green to yellowish midcosta prolonged beyond the obtuse apex as a short awn, shorter than to equaling the shallowly emarginate apex. Stamens 3, the anthers narrowly oblong, 2-2.5 mm long, with a very short, blunt, minutely bearded appendage at tip; style straplike, 2- or sometimes 3-branched, the branches glabrous, minutely scaly. Achene plano-convex, suborbicular to broadly ovate, 2-2.5 × 1.6-2.2 mm, smooth, brownish to grayish brown; bristles 1-6, reddish, with downcurved-retrorse barbs, shorter than to equaling the achene.

General distribution: United States, Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico and the Virgin Islands: In brackish or saline waters of marshes or marshy grounds and roadside ditches. Arecibo, Barceloneta, Guánica, Guayama, Ponce, Río Grande, and San Juan; St. Croix, St. Thomas, and Tortola.

Selected specimens examined: PUERTO RICO: Arecibo: Caño Tiburones, near Arecibo, *Gleason & Cook F-7* (NY). Barceloneta: Bo. Palmas Altas, Caño Tiburones, *Axelrod et al. 10521* (UPRRP, US). Guánica: *Sargent 199* (US). Guayama: Bo. Mosquito, Rd 3, km 154, *González-Más 1301* (NY, US). Río Grande: Bo. Zarzal, vicinity of Punta Picúa, *Proctor 43543* (US). San Juan: Park of Santurce, *Hioram 905* (US).

2. Schoenoplectus validus (Vahl) Á. Löve & D. Löve, Bull. Torrey Bot. Club 81: 33, 1954; *Scirpus validus* Vahl, Enum. Pl. 2: 268. 1805; *Scirpus lacustris* subsp. *validus* (Vahl) T. Koyama, Canad. J. Bot. 40:927, 1962. Type: West Indies. *Banks s.n.* (holotype: C-Vahl).

Scirpus lacustris sensu C.B. Clarke in Urban, Symb. Antill. 2: 93. 1900; and Urb., Symb. Antill. 4: 120. 1903, non Linnaeus, 1753.

Fig. 55. F-K

Emergent, rhizomatous perennial, 50-300 cm tall; rhizomes stout, scaly, horizontally creeping, 7-15 mm thick, reddish; roots pale brown to brown, to 1 mm thick. Culms erect, terete, easily compressed, 3-20 mm wide at base, forming in a row along the rhizome. Leaves 3-5 bladeless sheaths, short mucronate or the uppermost with short blades, confined to basal portion of culm; sheaths glabrous, with scarious margins, open at acute to rounded summit, the ventral portion gradually narrowing towards base to V-shaped orifice; ligule short, firm, ca. 1.5 mm long, borne at adaxial base of blade; blades 1-2 on upper sheaths, 2-20 cm long, dorsally flattened, thickened towards summit with cartilaginous tip. Inflorescence pseudolateral, anthelate, compound to partially decompound, pendulous, the numerous spikelets solitary or in small glomerules of 2-4 at ray tips; involucral bracts 2-3, the lowest one erect, looking like a continuation of the culm, the others membranaceous, scale-like; rays flat, to somewhat obtusely angled, glabrous, scabrous on margins, pendulous; spikelets ovoid to ovoid-ellipsoid, acute, 5-7 (-9) × 3-4 mm; scales ovate to elliptic, 2.5-3.2 × 1.8-2.2 mm, reddish brown, erose-ciliate, with scarious margins, the green midcosta prolonged as a short, scabrous awn at the emarginate apex. Stamens 3, marescent; anthers narrowly oblong, 1-2 mm long, tipped by a triangular-ovate appendage; style straplike, 2- or 3-branched, the branches glabrous, with minute scales. Achene plano-convex, broadly ovoid, 1.7-2.3 × 1.3-1.5 mm, smooth, grayish brown, reddish or black; bristles 2-6, retrorsely barbed, reddish, shorter than to equaling or slightly exceeding the achene.

General distribution: United States, Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico and the Virgin Islands: In wet areas, often in standing water of marshes, open swamps or swampy grounds, pastures, roadside ditches, and disturbed areas. Arecibo, Guánica, Guayama, Mayagüez, Ponce, Salinas, San Germán, Toa Baja, Utuado, and Vega Baja; St. Croix, St. Thomas, and Tortola.

Common name: Puerto Rico: *Junco.*

Note: This species is sometimes included within a broad circumscription of European *Schoenoplectus tabernaemontani* (C. C. Gmel.) Palla.

Selected specimens examined: Puerto Rico: Arecibo: Bo. Río Abajo, *Acevedo-Rdgz. & Cedeño 10190* (UPRRP, US). Guánica: *Sintenis 3846* (NY, US); *Sargent 200* (US); *N.L. Britton & Shafer 1859* (NY, US); near Guánica, *Heller 6290* (NY, US). Mayagüez: Vicinity of Mayagüez, *Chase 6320* (US). Ponce: *Stevens 2404* (NY). Salinas: Rd. 3, km 156, *González-Más 1294* (NY, US). San Germán: Road 2, km 200.9, *González-Más 1202* (NY). Toa Baja: Bo. Sabana Seca, *Axelrod et al. 9747* (UPRRP). Utuado: Bosque de Río Abajo, Saltillo, *Acevedo-Rdgz. 339* (SJ). Vega Baja: Bo. Cabo Caribe, E side of Rt 686, near coast, *Axelrod & Thomas 10208* (UPRRP, US).

16. SCLERIA

Scleria P. J. Bergius, Kongl. Vetensk. Acad. Handl. 26: 142. 1765.

Perennials or sometimes annuals; rhizomes when present horizontal or short and nodose, hardened and knotty, sometimes tuberous. Culms erect, elongating and sprawling, or climbing, trigonous or triquetrous, harshly scabrous to smooth, glabrous or pubescent, green. Leaves well-developed at middle and upper nodes, the basal ones essentially bladeless; sheaths 3-angled, closed at summit, distinctly veined, the apex of the inner band with a rounded, obtuse, or triangular contraligule with distinct, straight or anastomosing veins, the margin thickened or cartilaginous, sometimes with a short to elongate scarious appendage; ligule absent or sometimes present; blades linear-elongate or sometimes lanceolate, flattened-plicate to plicate or somewhat inrolled along margins, 3-costate, herbaceous, weakly to harshly scabrous on margins and costae, glabrous or sometimes pubescent. Inflorescence paniculate or spike-like, terminal, or terminal and a series of axillary partial panicles from the upper leaf-like bracts; panicle branches 3-angled, sometimes narrowly winged, scabrous or smooth, pubescent or glabrous; panicle bractlets linear-lanceolate or setaceous, often ciliate or scabrous on margins; spikelets unisexual, or bisexual and androgynous, sessile or on pedicels to 1 cm long; staminate spikelets lanceolate or narrowly oblong-ovate, cylindrical or subcompressed, many-flowered; staminate scales numerous, the basal 2-3 often 2-ranked and sterile, like the sterile pistillate spikelet scales, the upper fertile ones spirally imbricate,

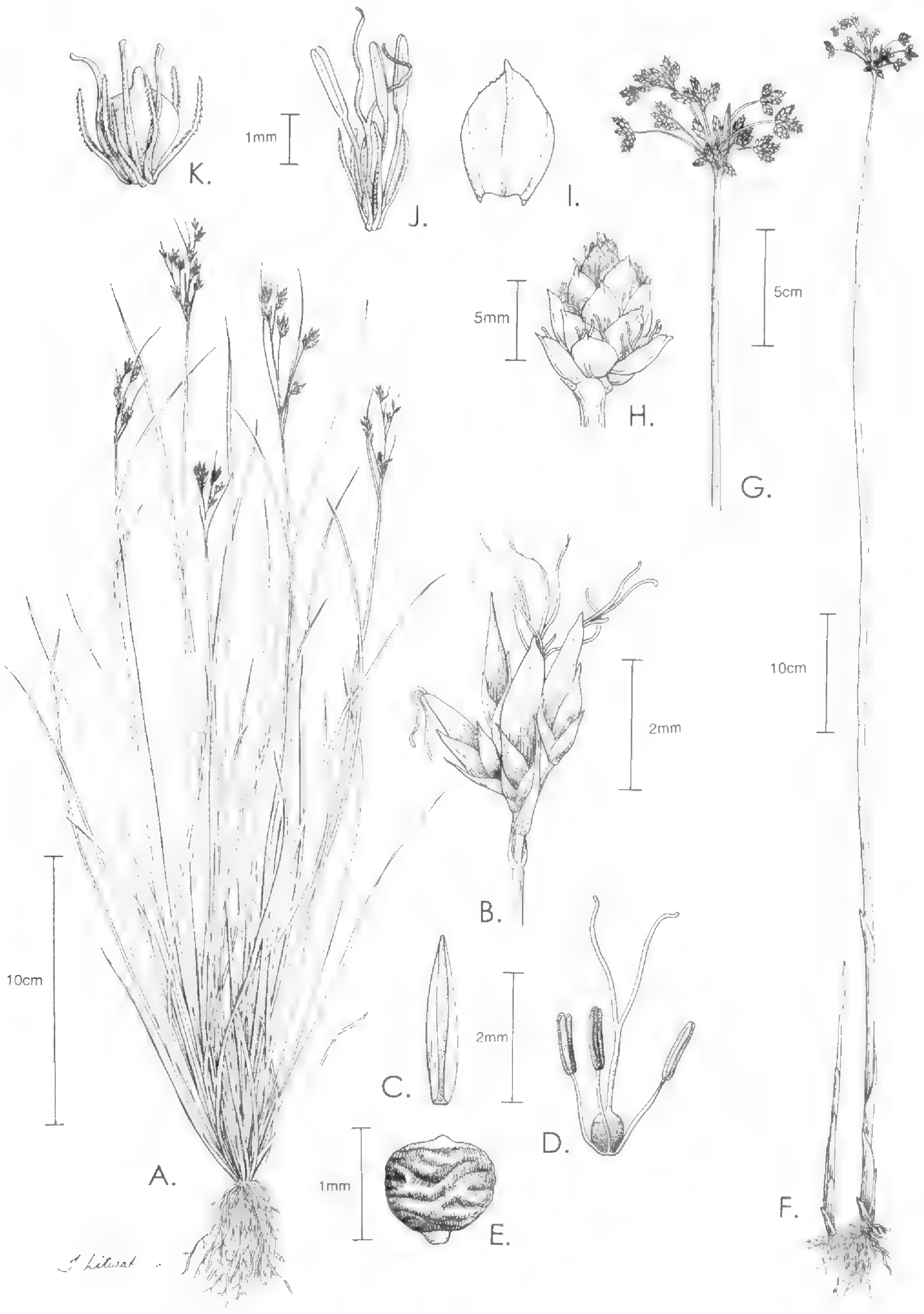


Fig. 55. A-E. *Rhynchospora depressirostris.* **A.** Habit. **B.** Terminal inflorescence unit. **C.** Spikelet scale. **D.** Flower. **E.** Achene. **F-K.** *Schoenoplectus validus.* **F.** Habit. **G.** Inflorescence. **H.** Spikelet. **I.** Spikelet scale. **J.** Flower. **K.** Achene. (A-D, from *Stevenson 889*; E, from *Johnston 884*; F-G and J, from *Proctor 42230*; H, I, and K, from *Proctor 45573*).

narrowly ovate to lanceolate, membranous; pistillate spikelets ovoid to ovoid-lanceoloid or ellipsoid, subcompressed, often becoming obovoid after expanding to the width of the mature achene, cylindrical to subcompressed, with a single terminal flower which is usually subtended by a much reduced, lanceolate fertile scale, hidden by the uppermost well-developed sterile scale; pistillate spikelet scales 2-ranked, the uppermost two broadly boat-shaped or cupuliform and spreading widely with the developing achene, carina 1- to 3-nerved, lateral nerves indistinct. Flowers unisexual; hypogynium (when present) borne at base of achene, sessile or stipitate, smooth or crustaceous, entire or 3-lobed, sometimes 3- to 9-tuberculate near base, the lobes entire or dissected, sometimes reflexed; cupula supporting the hypogynium and ovary shallow and dish-like, 3-lobed or obtusely trigonous with smooth margins, or deep and cup-like, enveloping the hypogynium and often ciliate on margin; stamens 1-3, the anthers often prickly-appendaged at apex; styles capillary, 3-branched, the unbranched portion glabrous. Achene body globose or ovoid to ellipsoid, rounded or obtusely trigonous, rarely trigonous or triquetrous, sometimes subconic, with straight to recurved apex, apiculate, bony or crustaceous, white or sometimes variegated with purple, glabrous or pilose, the surface smooth, rugose, reticulate, trabeculate, papillate, verrucose, or warty. A genus of primarily warm-temperate and tropical regions worldwide, with approximately 200-225 species.

LECTOTYPE: *Scleria flagellum-nigrorum* P. J. Bergius, *nom. conserv.*

References: Core, E. L. 1936. The American species of *Scleria*. Brittonia 2: 1-105. Camelbeke, K. and P. Goetghebeur. 1998. *Scleria* (Cyperaceae). Pp. 641-659. *In*: D.M. Kearns et al., Cyperaceae, Flora of the Venezuelan Guayana. Vol. 4, Caesalpiniaceae-Ericaceae, eds. P.E. Berry, B.K. Holst, and K. Yatskievych, Missouri Botanical Garden Press, St. Louis, MO. Camelbeke, K., K. Spruyt and P. Goetghebeur. 2003. The genus *Scleria* (Cyperaceae) in Bolivia. Revista Soc. Boliv. Bot. 4(1): 139-170.

Key to the species of *Scleria*

1. Slender perennials or annuals, erect or ascending, never vine-like; hypogynium wanting or inconspicuous, when present, trigonous, not bearing a pearl-colored pebbly crust nor supporting tubercles; achene body often porose proximally..... 2
   2. Inflorescence a solitary fascicle of spikelets at the summit of the culm; achene body longitudinally ridged with a pair of iridescent pits on each side proximally..... 6. *S. georgiana*
   2. Inflorescence of 2 or more fascicles or panicles; achene bodies smooth, verrucose, or tuberculate, lacking iridescent pits proximally..... 3
      3. Inflorescence composed of a terminal and series of 2-3 remote, axillary, narrow partial panicles; spikelet scales finely appressed-pubescent ..... 9. *S. lithosperma*
      3. Inflorescence interruptedly fasciculate-spicate; spikelet scales glabrous or coarsely setose..... 4
         4. Spikelet scales glabrous .....16. *S. verticillata*
         4. Spikelet scales coarsely setose..... 5
            5. Perennial with horizontally creeping rhizome; fascicles of spikelets nodding..... ..... 4. *S. distans*
            5. Caespitose annual; fascicles or single spikelets ascending..... 8. *S. hirtella*
1. Medium-sized to coarse perennials, erect or sometimes vine-like; hypogynium present, generally conspicuous, 3-lobed, trigonous, or discoid, sometimes bearing a pearl-colored pebbly crust, or supporting tubercles between it and achene body, or hidden by the well-developed cupula which is entire, ciliate, or lacerate on its margin; achene body rarely porose..... 6
   6. Hypogynium hidden by the well-developed cupula which is ciliate on its margin (sparsely and inconspicuously so in *Scleria mucronata*), not supporting tubercles. 7
      7. Edges of leaf blade abruptly narrowed at base, not decurrent or only very narrowly so along the lateral margins of the sheath; cupula sparsely and inconspicuously ciliate on margins; style base smooth or essentially so..... 12. *S. mucronata*
      7. Edges of leaf blade decurrent and forming broad wings along the lateral margins of the sheath; cupula densely ciliate on margins; style base finely antrorsely scabrid (at least proximally). 8

8. Culms (5-) 6-12 mm wide; leaf blades (10-) 13-27 mm wide; achene body 2.5-3 mm wide; style base 0.8-1.2 mm long ..... 5. *S. eggersiana*
8. Culms 3-6 mm wide; leaf blades 4-13 (-15) mm wide; achene body 1.2-1.9 mm wide; style base 0.3-0.5 mm long ..... 11. *S. microcarpa*

6. Hypogynium not hidden by the cupula, smooth on margins, with or without tubercles between it and achene body..... 9
9. Achene body reticulate or verrucose..... 10
10. Hypogynium trigonous, with a pearl-colored pebbly crust on sides between the decurrent costae of the achene body; achene body shallowly reticulate to nearly smooth..... 7. *S. havanensis*
10. Hypogynium 3-lobed, without a pearl-colored pebbly crust on its sides; achene body distinctly reticulate or verrucose..... 11
11. Hypogynium deeply 3-lobed, the tips of the lobes appressed to the base of the achene body, lacking tubercles; achene body reticulate..... 12. *S. muehlenbergii*
11. Hypogynium shallowly 3-lobed, the lobes short, not reaching achene body, supporting three entire or 2-lobed tubercles; achene body verrucose..... 12
12. Plant glabrous except for the strigillose sheaths; achene body 1-2 mm diam..... 1. *S. brittonii*
12. Plant pubescent, densely ciliate on angles of sheaths and culms, margins and abaxial midveins of leaf blades and inflorescence bracts, and carina of spikelet scales; achene body 2-3 mm diam ..... 3. *S. ciliata*

9. Achene body smooth..... 13
13. Hypogynium trigonous, with a pearl-colored pebbly crust on sides between the decurrent costae of the achene body; achene body shallowly reticulate to nearly smooth ..... 7. *S. havanensis*
13. Hypogynium 3-lobed or obscurely so; achene body smooth..... 14
14. Plants erect, not scrambling or climbing ..... 10. *S. melaleuca*
14. Plants vine-like or scandent, scrambling or climbing, often forming impenetrable masses..... 15
15. Contraligule typically with a scarious appendage at its apex; hypogynium obscurely 3-lobed, discoid, irregularly wrinkled ..... 15. *S. secans*
15. Contraligule lacking an appendage at apex with a cartilaginous, often ciliate or pubescent margin; hypogynium distinctly 3-lobed, the lobes reflexed..... 16
16. Inflorescence panicles open; leaf blade margins with coarse barbs, 0.2-0.5 mm long; spikelet scales dark brown or purplish brown; achene body ovoid-globose to ovoid, 2.6-3.3 mm long; hypogynium lobes strongly revolute, obtuse, typically appressed to base of achene body ..... 2. *S. canescens*
16. Inflorescence panicles contracted; leaf blade margins with fine barbs, less than 0.2 mm long; spikelet scales greenish brown; achene body globose, 2.3-2.6 mm long; hypogynium lobes weakly revolute, rounded, often spreading away from base of achene body..... 14. *S. scindens*

1. Scleria brittonii Core in Small, Man. S. E. Fl. 190. 1933, as a new name for *Scleria glabra* (Chapm.) Britton in Small, Fl. s.e. U.S. 200. 1903, non Boeckeler, 1888; *Scleria pauciflora* var. *glabra* Chapm., Fl. South. U.S. 532. 1860; *Scleria ciliata* var. *glabra* (Chapm.) Fairey, Castanea 32: 48. 1967. Type: United States; Florida. *Chapman s.n.* (lectotype: NY, isolectotypes: NY!, US!), designated by Fairey, Castanea 32: 51. 1967.

Slender, rhizomatous perennial, 20-70 (-90) cm tall; rhizome horizontal, nodose, 1.5-5 mm thick, often densely branched and interwoven with

those of previous seasons. Culms erect, triquetrous, glabrous, smooth on angles, 0.7-1.7 (-2) mm wide. Leaves 3-5 below inflorescence; sheaths unwinged, retrorsely scabrid on angles, densely strigillose, brownish, stained with purple distally; contraligule convex to rounded, strigillose with a scarious margin; ligule absent; blades plicate, the lowermost short, often bifid, 3-25 (-40) cm × 1-2.5 mm, glabrous both abaxially and adaxially, margins, abaxial midvein, and adaxial lateral veins remotely antrorsely scabrous (at least distally), long-attenuate to triquetrous apex. Inflorescence composed of a terminal and series of 1-2 remote, turbinate, long-peduncled partial panicles from the upper leaf-like bracts, the terminal one largest 0.6-1.7 cm diam.; bractlets lanceolate-subulate, ciliate-scabrous; spikelets 5-7 mm long, the lowermost scales spreading to 4 mm with mature achene; staminate scales yellow-brown; sterile pistillate spikelet scales 3, ovate-lanceolate to lanceolate, 3-5 × 1.5-2.6 mm, glabrous, stramineous to light brown, reddish lineolate, glabrous on margins, carina 3-nerved, prolonged beyond the acuminate apex as a scabrous mucro. Staminate flower with 3 stamens, the anthers 2-3 mm long, with a linear-subulate apiculum beset with antrorse crystalline prickles. Achene body globose, 1.5-2 × 1.7-2 mm, transversely verrucose-reticulate, or sometimes nearly smooth, apiculate, 2-porose on each side, estipitate, white or sometimes with grayish patches; style base deciduous; hypogynium narrow, obtusely trigonous, 0.5-0.7 × 0.8-1 mm, supporting 3 entire or 2-lobed tubercles.

General distribution: Southeastern United States, Cuba, and Puerto Rico.

Distribution in Puerto Rico: Sand savannas. Vega Baja, known to occur only in the vicinity of Laguna Tortuguero.

Note: The glabrous culm, leaf blades, and inflorescence; densely strigillose sheaths; and consistently smaller achenes separate this species from the closely related *Scleria ciliata*.

Selected specimens examined: Puerto Rico: Manatí: Laguna Tortuguero, May 1960, *Woodbury s.n.* (US); Tortuguero area, *Liogier 33563* (UPR).

2. Scleria canescens Boeck., Beitr. Cyper. 1: 37. 1888. Type: Puerto Rico. Guayama. *Kuntze s.n.* (holotype B, destroyed; isotype: NY!).

Fig. 56. A, B

Robust perennial, 0.5-3 m tall, growing in large colonies, often forming dense tangles; rhizome stout, nodose. Culms ascending, vine-like and clambering, solitary from nodes of the rhizome, sharply trigonous, 3-10 mm wide, antrorsely and retrorsely scabrous or scabrid on angles, sparsely strigose and scabrid on sides towards the apex, glabrous at base. Leaves numerous, the uppermost overtopping the inflorescence; sheaths stiff, loose, glabrescent, with a deltate or sub-rounded contraligule, with straight veining, the margin cartilaginous, canescent to glabrescent; ligule absent; blades plicate or subflattened, 25-60 cm × 4-10 mm, stiff, somewhat coriaceous, sharply retrorsely scabrous on margins and abaxial midvein, the apex acuminate to blunt, flattened tip. Inflorescence composed of a terminal, open, pyramidal panicle, (5-) 6-14 × (3.5-) 4-11 (-13) cm and 1 to 3 additional smaller lateral panicles in the upper leaf-like bracts; bractlets setaceous, ciliate on margins proximally; panicle branches minutely pubescent to glabrescent; staminate spikelets about the same length as the pistillate; pistillate spikelets ovate-elliptic, 4-6 × 2-3 mm; sterile pistillate spikelet scales 4-5, ovate-orbicular, the uppermost one 3.5-5 × 2-3.7 mm, the lower successively smaller, canescent, brown or reddish brown with purple-black veins and margins, finely ciliate on margins, carina 1-nerved, shortly prolonged beyond the acute apex. Staminate flowers with 3 stamens, the anthers 2-3 mm long, with a subulate-conic apiculum. Achene body ovoid-globose to ovoid, 2.6-3.3 × 2.4-2.8 mm, minutely apiculate, shiny white to purple-tinged; hypogynium 1-1.8 × 2-2.7 mm, 3-lobed with broad, strongly revolute, obtuse, entire, ascending lobes which are appressed to base of achene body.

General distribution: Apparently endemic to Puerto Rico, although reported by León (1946) from Cuba.

Distribution in Puerto Rico: Wet montane, secondary, or palm forests, in openings, along trails, and forest edges. Adjuntas, Caguas, Cayey, Ciales, Guayama, Jayuya, Maricao, Naguabo, Orocovis, Patillas, and Río Grande.

Common name: Puerto Rico: *Cortadora.*

Selected specimens examined: Puerto Rico: Adjuntas: Monte Guilarte State Forest, *Proctor & Alemany 45833* (SJ). Barranquitas: Monte Torrecilla, *N.L. Britton et al. 5544* (NY). Caguas:

Sierra de Cayey, Carite Forest Reserve, *Proctor 47890* (SJ, US). Cayey: Carite Forest Reserve, *Axelrod & Axelrod 4375* (NY, UPRRP). Ciales: Cordillera Central, Toro Negro State Forest, *Proctor & Haneke 44588* (SJ). Ceiba: Caribbean National Forest, Fs Rd 27, *Axelrod et al. 481* (UPRRP). Jayuya: Cordillera Central, Bo. Coabey, *Proctor & Haneke 42037* (SJ). Las Piedras: Luquillo Forest, peak of El Toro, *Hill 46* (NY). Luquillo: Sierra de Luquillo, along Pico del Este road, *Taylor & Walker 11854* (NY, UPRRP). Maricao: Río Maricao, *N.L. Britton et al. 2432* (NY, US); Bo. Maricao Afuera, Río Maricao margins, *Cedeño & de la Cruz 639* (MAPR). Miramontes, *N.L. Britton & E.G. Britton 9537* (NY). Naguabo: Sierra de Luquillo, summit of La Mina, *Shafer* 3317 (NY, US); Sierra de Luquillo, *Proctor 47981* (US). Orocovis: Doña Juana, Toro Negro, *Liogier & Martorell 35107* (NY). Patillas: Carite Forest Reserve, *Axelrod et al. 1951* (UPRRP). Ponce: Toro Negro Forest Reserve, *Axelrod & Chávez 4285* (NY, UPRRP). Río Grande: El Yunque, *Fosberg 44190* (US).

3. Scleria ciliata Michx., Fl. Bor.-Amer. 2: 167. 1803. Lectotype: United States; "Carolina". *M. Michaux* (P), designated by Fairey, Castanea 32: 50. 1967.

Rhizomatous perennial, 20-50 cm tall; rhizome horizontal, nodose, 3-6 mm thick, often densely branched and interwoven with those of previous seasons. Culms ascending to erect, triquetrous to trigonous, sparsely pubescent on sides, densely ciliate on angles, 0.8-3 (-4) mm wide. Leaves 3-7; sheaths unwinged, densely ciliate on angles, short-pilose on sides, light brown to reddish brown, the lowermost often forming short, 2-fid blades; ligule absent or sometimes a faint line; contraligule obtuse to rounded, pubescent, the margin often densely ciliate; blades plicate to subflattened, 10-53 cm × 1-4 mm, pubescent to glabrous both abaxially and adaxially, margins and abaxial midvein densely ciliate, acute to acuminate to a triquetrous or 2-fid tip. Inflorescence composed of a single terminal panicle or often with a remote, smaller second one below from the upper leaf-like bracts, the terminal one 1-2.5 × 0.5-1 cm, subtended by an erect leaf-like bract appearing as a continuation of the culm; bractlets linear-lanceolate, densely ciliate; spikelets unisexual (female) or androgynous, the staminate portion (spikelet) borne at the base of the cupula; staminate spikelets 4-7 × 0.8-1.6 mm; staminate scales brown; pistillate spikelets ovoid to ovoid-ellipsoid, slightly compressed, 3.5-6 × 1-2 mm; sterile pistillate spikelet scales 3-4, ovate to lanceolate, 3-5 × 1.5-2.5 mm, pubescent to sparsely so, finely reddish lineolate, light brown, tinged with dark brown or purple on distal sides and margins, carina 1- to 3-nerved, prolonged beyond the acute to acuminate apex as an excurved awn. Staminate flower with 3 stamens, the anthers 2.5-3 mm long, with a prickly apiculum. Achene body globose, 2-3 mm diam., transversely verrucose-reticulate, often papillate distally, or sometimes nearly smooth, apiculate, eporose, estipitate, white or sometimes with grayish patches or green-mottled; style base deciduous; hypogynium narrow, obtusely trigonous, 0.5-0.8 × 1-1.5 mm, light yellow or stramineous on sides, supporting 3 entire or 2-lobed tubercles at base.

General distribution: United States, Mexico, Central America, and the West Indies.

Distribution in Puerto Rico: Dry grassy slopes and damp ravines, on lateritic soil, 350-400 m. Maricao (Maricao Forest Reserve) and Mayagüez (Cerro Las Mesas and vicinity).

Selected specimens examined: Puerto Rico: Maricao: Bo. Maricao Afuera, Maricao Forest Reserve, *Axelrod & Stenzel 11107* (UPRRP). Mayagüez: Las Mesas near Mayagüez, 29 Dec 1914, *Holm s.n.* (US); 23 Nov 1914, *Holm 45* (US).

4. Scleria distans Poir. in Lamarck, Encycl. 7: 4. 1806. Type: Puerto Rico. *Ledrú 110* (lectotype: P; isolectotype: P), designated by J. Raynal, Adansonia, ser. 2. 16: 216. 1976.
Scleria nutans Willd. ex Kunth, Enum. Pl. 2: 351. 1837. Type: Venezuela. *Humboldt s.n.* (holotype: B-Willd. 17336; isotypes: HAL, P).

Slender perennial, 15-60 cm tall; rhizome scaly, horizontally creeping, 2-4 mm thick. Culm erect, triquetrous, 0.8-2.7 (-3) mm wide, glabrous, angles smooth, wire-like. Leaves 2-8; sheaths subinflated at apex, unwinged, hirsute to glabrescent, angles smooth or hirsute; ligule absent; contraligule obtuse or slightly concave, with hirsute margin, the inner band often hirsute in a longitudinal line medially; blades flattened to subplicate, 1-20 cm × 1.7-4 (-5) mm, abaxial and

adaxial surface glabrous, margins, midvein, and lateral veins often hirsute, or sparsely so, subabruptly narrowed to an acute or acuminate, subflattened apex. Inflorescence terminal, interruptedly glomerate-spicate with no lateral branching, 8-22 cm × 7-10 mm, composed of 4-10, sessile, fascicles of spikelets; fascicles 4-8 mm diam., with 3-7 (-9) spikelets, reflexed at maturity; bractlets ciliate at base, margins with dark hairs; spikelets bisexual (androgynous), ovoid-ellipsoid, 3.5-5 × 0.8-1.3 mm; staminate scales lanceolate, membranous; pistillate scale ovate to ovate-lanceolate, 2-2.5 (-3) × 1-1.5 mm (excluding awn), sparsely setose on sides, pale green to dark purplish brown, carina 1-nerved, setose, prolonged beyond the acute apex as a setose awn. Staminate flowers with 2 stamens, the anthers 1.7-2.2 mm long, with a lanceolate, bristly appendage at apex. Achene body subglobose to broadly obtusely trigonous in cross section, 1.4-1.8 × 1-1.3 mm, broadly obtuse to rounded at apex, apiculate, with a brownish or blackish apiculum, porose, smooth, white or grayish, with a stipe-like, trigonous base; style base deciduous; hypogynium inconspicuous, 3-lobed, with setaceous awl-shaped lobes, these often impressed into margins of base.

General distribution: Southeastern United States, Panama, West Indies, South America, and tropical and southern Africa, including Madagascar.

Distribution in Puerto Rico: In moist or wet sandy soils of savannas, pastures, meadows, grassy slopes, and roadside banks. Aibonito, Cayey, Dorado, Guayama, Lares, Mayagüez, Moca, Naguabo, Río Grande, San Juan, Vega Alta, and Vega Baja.

Selected specimens examined: PUERTO RICO: Aibonito to Cayey, *Chase s.n.* (US). Dorado: W or Dorado, *Woodbury s.n.* (US). Lares: *Sargent 3253* (US). Moca: *Sargent 366* (US). Naguabo: Caribbean National Forest, *Axelrod & Grose 11224* (UPRRP). Río Grande: El Yunque, *Fosberg 44197* (US); Sargent 554 (US). San Juan: Santurce, *Heller & Heller 986* (US); Río Piedras, *Stevenson 6488* (US). Vega Alta: Bo. Sabana, *Proctor & Concepción 41833* (US).

5. Scleria eggersiana Boeck., Beitr. Cyper. 2: 41. 1890. Type: Cuba. *Eggers s.n.* (holotype: B, destroyed).

Scleria microcarpa var. *latifolia* Boeck., Linnaea 38: 517. 1874. Type: Guadeloupe. Collector unknown (holotype: B, destroyed).

Scleria microcarpa sensu Grisebach, Fl. Brit. W. I. 578. 1864, pro parte, non Nees von Esenbeck, 1834.

Scleria mitis sensu Grisebach, Fl. Brit. W. I. 578. 1864, non P. J. Bergius, 1765.

Scleria grisebachii C. B. Clarke in Urban, Symb. Antill. 2: 150. 1900. Lectotype: Martinique. *Duss 445* (NY!), here designated.

Coarse, rhizomatous perennial, 1-3 m tall; rhizome short, horizontal, scaly, knotty at culm bases, 5-10 mm thick. Culm erect, approximate or remotely spaced on rhizome, obtusely trigonous to trigonous proximally, trigonous to triquetrous distally, stiff and hardened, (5-) 6-12 mm wide, glabrescent, smooth, retrorsely scabrid on angles. Leaves 5-8; sheaths broadly winged, glabrous, angles retrorsely scabrous or irregularly scabrid; ligule absent; contraligule triangular to lanceolate, the margin cartilaginous, crisped, ciliate-scabrous; blades subflattened to plicate, 20-70 × (1-)1.3-2.7 cm, glabrescent, margins and abaxial midvein antrorsely scabrous, the distal margins often forming small, obliquely positioned ears, above these, the blade is acuminate to a blunt, subflattened apex. Inflorescence composed of a terminal and series of 2-5 (-8), narrowly rhombic, axillary partial panicles from the upper leaf-like bracts, the terminal one largest, 7-15 × 1.5-4 cm; bractlets linear, finely ciliate on margins; spikelets unisexual; staminate spikelets 3.5-4.2 × 1.2-1.6 mm; staminate scales golden brown to light reddish brown; pistillate spikelets ovoid, 3-4 × 2.5-4 mm; sterile pistillate spikelet scales 4, ovate-orbicular, the uppermost 1.6-2.8 mm diam., yellowish brown, reddish brown-lineolate, carina 1-nerved, shortly prolonged beyond the acute to broadly acute apex. Staminate flower with 3 stamens, the anthers 1.4-2 mm long, with a triangular-subulate prickly apiculum. Achene body ovoid to subglobose or globose, 2-2.5 × 2.5-3 mm, rounded to subtruncate at apex, not apiculate, smooth, glabrous, white to grayish white, estipitate, eporose; style base deciduous or persistent, conic-cylindrical, 0.8-1.2 × 0.4-0.6 mm, finely antrorsely scabrid; hypogynium 3-lobed, adhering to and hidden by the spongy-thickened, tan to yellowish, darker reticulate-veined,

rugulose, shallowly 3-lobed cupula, 1.3-2.3 × 2.8-3.3 mm, which is densely ciliate on its rim, the hairs yellow-brown.

General distribution: Southern Mexico, Central America, West Indies, Trinidad, Tobago, and northern South America.

Distribution in Puerto Rico: Wet or damp areas of marshy habitats, forest margins, swales, drainage ditches, canals, pastures, and roadside ditches. Bayamón, Cataño, Loíza, Luquillo, Maunabo, Naguabo, and Río Grande.

Common names: Puerto Rico: *Cortadera, Cortadora, Cortadora de altura, Lambedora.*

Selected specimens examined: PUERTO RICO: Bayamón: *Sintenis 1215* (US). Río Grande: Sierra de Luquillo, *Sintenis 1443, 1714* (US); Bo. Herreras, Rd. 187, *Proctor 45162* (US); *Proctor & Rivera 48358* (US).

6. Scleria georgiana Core, Brittonia 1: 243. 1934; *Scleria gracilis* Elliott, Sketch Bot. S. Carolina 2: 557. 1824, *nom. illeg.*, non Richard, 1792. Type: United States; Georgia. *Baldwin s.n.* (holotype: CHARL; isotype: NY).

Slender rhizomatous perennial, (12-) 18-65 (-80) cm tall; rhizome horizontal, nodose, 2.5-4 mm thick, often densely branched and interwoven with those of previous years. Culms erect, wiry, trigonous, glabrous, smooth on angles or sometimes sparsely antrorsely scabrous at apex, 0.7-1.5 mm wide. Leaves 1-3; sheaths elongate, unwinged, hispidulous to glabrous, purplish; ligule absent; contraligule absent or essentially so, the orifice convex to truncate, or subdeltate on upper sheaths, hispidulous; blades triangular-channeled proximally, trigonous distally, lowermost on culm with short plicate or 2-parted blades, 2-30 cm × 0.3-1 mm, to 1.5 mm wide at base, glabrous, edges of channel antrorsely scabrous, attenuate to triquetrous apex. Inflorescence composed of a single terminal fascicle of (-1) 2-8 (-14) spikelets at the summit of the culm, or sometimes a second smaller, subcontiguous fascicle below, 5-15 mm in diam.; involucral bracts 2-3, leaf like but reduced, the lowermost one elongate, 1-16 cm long, overtopping the inflorescence and appearing as a continuation of the culm; spikelets unisexual (female) or androgynous, the staminate portion (spikelet) borne at the base of the cupula; staminate spikelets 5-7 × 1.5-2.5 mm; staminate scales reddish brown; pistillate spikelets ovoid to ovoid-lanceoloid, slightly compressed, 3.5-7 × 1.5-2.5 mm; sterile pistillate spikelet scales ovate to ovate-lanceolate, 3.5-6 × 2-4 mm, light brown, finely reddish lineolate, stained with dark brown or reddish brown on distal sides and margins, carina 1-nerved, prolonged beyond the acute to acuminate apex as a short straight to slightly excurved awn. Staminate flowers with 3 stamens, the anthers 3-4 mm long, with a bristly apiculum. Achene ovoid or ovoid-ellipsoid, 2.5-2.7 × 1.7-2 mm, longitudinally ridged or indistinctly so, broadly obtuse to rounded at apex, apiculate, eporose, estipitate, milky white, sometimes stained (often uniformly so) with purple, the base trigonous, concave and bearing 2 iridescent pits on each side; style base deciduous; hypogynium absent.

General distribution: Southeastern United States, Belize, Greater Antilles, and Brazil.

Distribution in Puerto Rico: Wet sands in savanna-like swales or seasonal pools. Vega Baja, known to occur only in the vicinity of Laguna Tortuguero.

Selected specimens examined: PUERTO RICO: Manatí: Laguna Tortuguero, 03 Dec 1960, *Woodbury s.n.* (US); May 1960, *Woodbury s.n.* (US); 2 Feb 1970, *Woodbury s.n.* (US). Vega Baja: Bo. Algarrobo, just S of Laguna Tortuguero, *Proctor et al. 45031* (US).

7. Scleria havanensis Britton, Bull. Torrey Bot. Club. 42: 492. 1915. Type: Cuba. *León 4731* (holotype: NY!).

Rhizomatous perennial, (15-) 30-110 (-150) cm tall; rhizomes relatively stout, horizontal, nodose, 4-6 mm thick. Culms crowded along rhizome, erect, slender, trigonous proximally, triquetrous distally, glabrous, scabrid to smooth on angles, 1.2-2 mm wide. Leaves 4-8; sheaths unwinged, scabridulous to glabrescent, scabrid on angles, light brown, often tinged with red; ligule absent; contraligule short, convex to subtruncate, often callous-thickened medially, retrorsely pubescent, narrowly scarious on margin; blades plicate, 4-45 cm × 1.4-3.4 mm, often scabridulous on adaxial surface, margins antrorsely scabrid to smooth, the apex acuminate to blunt subflattened tip. Inflorescence composed of a single, small, terminal panicle, 1.5-3 cm in diam., or sometimes a second smaller lateral one below, from the upper

reduced leaf-like bracts; lowest panicle branch often divergent and at a right angle to main axis; bract of terminal panicle erect, often exceeding panicle, up to 13 cm long; bractlets linear-setaceous, smooth to scabrid on margins; spikelets bisexual (androgynous); staminate spikelets 4-5 × 1-1.5 mm; pistillate spikelets oblong-lanceolate, subcompressed, 3-5 × 1-2 (spreading to 5 mm); sterile pistillate spikelet scales 3, ovate-lanceolate, 3-4.5 × 1.4-2.2 mm, light brown, finely reddish brown lineolate, brown at base or sometimes along the narrowly scarious margins, carina 3-nerved, often obscurely so, greenish, mucronate at the acute to acuminate apex. Staminate flowers with 3 stamens, the anthers 1.9-2.6 mm long, with a very fine subulate-prickly apiculum. Achene body ovoid, obtusely trigonous to subrounded, 2-2.6 × 1.6-2 mm, obtuse to acute at apex, short-apiculate, estipitate, eporose, shallowly reticulate to nearly smooth, glabrous, white; style base deciduous; hypogynium trigonous, with a pearl-colored pebbly crust on sides between the decurrent costae of the achene body.

General distribution: Cuba, Hispaniola, and Puerto Rico.

Distribution in Puerto Rico: On dry or damp serpentine soils or shale, in stony thickets, barrens, hillsides, forest edges and trails, and roadside slopes. Arecibo, Maricao, Mayagüez, Sabana Grande, San Germán, and Yauco.

Selected specimens examined: Puerto Rico: Arecibo: Santana, *Vélez 1398, 1399* (US). Maricao: Rd. 119 to San Germán, km 15.3, *González-Más 1657, 1659* (US); Forest Descanso trail, *González-Más 1636* (US). Mayagüez: Las Mesas, near Mayagüez, *Holm 41* (US).

8.Scleria hirtella Sw., Prodr. 19. 1788; *Hypoporum hirtellum* (Sw.) Nees, Linnaea 9: 303. 1834. Type: Jamaica. *Swartz s.n.* (holotype: BM; isotypes: B, M, S-Sw. R-5625).

Scleria doradoensis Britton, Bull. Torrey Bot. Club 50: 55. 1923. Type: Puerto Rico. *Britton et al. 7064* (holotype: NY!; isotypes: UPR!, US!).

Slender loosely caespitose annual, 10-55 (-70) cm tall. Culms erect, unbranched, triquetrous, soft, flexible, glabrous, smooth on angles, 0.6-1.5 mm wide. Leaves 3-5 per culm; sheaths elongate, unwinged, reddish or the uppermost tinged with red, often with sparse translucent hairs, the angles smooth; ligule absent; contraligule indistinct, with a tuft of translucent hairs, the convex margin sometimes with an inconspicuous scarious appendage; blades flattened-plicate, lowermost on culm with short plicate or 2-parted blades, 2-20 cm × 1.5-3 mm, glabrous or essentially so, margins and abaxial midvein smooth proximally, antrorsely scabrous distally, the apex acuminate. Inflorescence terminal, interruptedly glomerate-spicate with no lateral branching, composed of 3-10 (-13), sessile, axillary partial fascicles of spikelets, these 4-7 mm diam.; bractlets coarsely ciliate, often with purplish brown hairs; spikelets bisexual (androgynous), 2.5-3.5 × 1-2 mm; staminate scales brown, tinged with brown-black distally; sterile pistillate spikelet scales 3, ovate to ovate-lanceolate, 1.7-2.5 × 0.8-1.4 mm, (excluding awn), stramineous to golden brown, reddish lineolate, stained with brown-black on sides and margins, carina 1-nerved, often strigose, prolonged beyond the acute to acuminate apex as a curved, strigose awn. Staminate flower with 2 stamens, the anthers 0.9-1.3 mm long, with a black prickly apiculum. Achene globose to subglobose, or obloid, rounded in cross section, 1.5-1.9 × 1-1.4 mm, smooth, sparsely and obscurely tuberculate, or distinctly verrucose-tuberculate, rounded to broadly rounded at apex, apiculate, 3- to 5-porose on each side, glabrous, shiny, bright white to gray, with a trigonous or triquetrous, stipe-like base, the very base, just above its attachment, with a narrow, reddish or greenish, cellular-reticulate band on each side; style base deciduous; hypogynium absent.

General distribution: Central America, West Indies, Trinidad, and South America.

Distribution in Puerto Rico: Wet, sandy soils in savannas, borders of lakes and marshes, grassy hillsides, forest edges, pasture, and roadside ditches. Aguada, Dorado, Manatí, Mayagüez, Vega Alta, Vega Baja, and Yabucoa.

Note: The type of *Scleria doradoensis* is distinguished by the verrucose-papillate achenes, while those of *S. hirtella* are essentially smooth. However, intermediate achenes between these two stages are common, often occurring in the same population. The intermediate achenes exhibit various degrees of papillosity or verrucosity, but

the morphology of the trigonous base remains uniform.

Selected specimens examined: PUERTO RICO: Aguada: *Sargent 586* (US). Dorado: Vicinity of Dorado, *N.L. Britton et al. 7064* (NY, UPR); Bo. Higuillar, *Proctor 43225* (US); To Cerro Gordo, Rd. 693, km 13, *González-Más 306* (US). Manatí: Bo. Tierras Nuevas Saliente, *Axelrod et al. 10964* (UPRRP). San Juan: Santurce, *Heller & Heller 591* (US). Vega Alta: Espinosa, *Stevenson 2606* (US). Vega Baja: Tortuguero Lagoon, *Woodbury s.n., 12 Mar 1960* (NY); *González-Más 1065* (US); *González-Más & Reda 2164* (US).

9. Scleria lithosperma (L.) Sw., Prodr. 18. 1788; *Scirpus lithospermus* L., Sp. Pl. 51. 1753. Lectotype: Rheede, *Hort. Malab. 12: t. 48. 1693*, designated by Camelbeke & Goetghebeur, Taxon 49: 295. 2000.

Scleria filiformis Sw., Prodr. 19. 1788; *Scleria lithosperma* var. *filiformis* (Sw.) Britton, Ann. New York Acad. Sci. 3: 231. 1885. Type: Hispaniola. *Swartz s.n.* (holotype: probably S-Sw.).

Scleria purpurea Poir. in Lamarck, Encycl. 7: 4. 1806. Type: St. Thomas, U.S. Virgin Islands. Collector unknown (holotype: P-Lam.).

Scleria krugiana Boeck., Beitr. Cyper. 1: 35. 1888. Type: Puerto Rico. *Sintenis 4945* (holotype: B, destroyed; isotypes: L, NY!).

Fig. 54. E-J

Slender caespitose perennial, (20-) 50-90 (-105) cm tall; rhizomes short, nodose, 2-4 mm thick. Culms ascending to erect, crowded together along nodes of the rhizome, trigonous, filiform, stiff, 0.5-2 mm wide, weakly antrorsely scabrous on the angles, pilose to essentially glabrous on sides. Leaves 6-10 per culm, shorter than the inflorescence; sheaths pilose to glabrescent, red-tinged, purplish proximally; ligule absent; contraligule triangular or subrounded, the margin hispid; blades plicate, often inrolled along margins, 2-25 (-35) cm × 1-3.5 mm, abaxially green, pilose to glabrescent, adaxially bluish green, shiny and glabrous except for the pilose midvein, antrorsely scabrous on margins and abaxial midvein, long-acuminate to triquetrous apex. Inflorescence composed of a terminal and series of 1-3 remote, axillary, narrow partial panicles, the terminal one 2-5 × 1-1.5 cm; bractlets subulate, to 3 cm long; panicle branches scabrous on margins; spikelets sessile or short-stalked, bisexual or unisexual; staminate spikelets 4-5 × 1 mm; fertile staminate scales 4-5 × 1 mm, brown; pistillate spikelets narrowly ovoid, 5-7 × 2-3 mm, typically bearing a reduced staminate spikelet just below attachment (cupula) of maturing fruit; sterile pistillate spikelet scales 4-5, ovate-lanceolate, 3-5 × 1.2-1.4 mm, thin, submembranous, glabrous to sparsely pilose, dark brown above, ciliolate along margins; carina 1-nerved, lateral nerves indistinct, prolonged beyond the acuminate apex as a short to elongate mucro. Staminate flowers with 1 (-2) stamens, the anthers 1-2 mm long, with a triangular-subulate prickly apiculum. Achene ellipsoid to ellipsoid-obovoid, obtusely trigonous, umbonate, 2-2.5 × 1.5-1.8 mm, obtuse or sub-rounded at apex, apiculate, eporose, smooth, shiny, bone-white when mature, with a stipe-like, trigonous base bearing a depression between the costae on each side, the very base, just above its attachment, with a greenish or reddish cellular-reticulate ring surrounding it; hypogynium absent.

General distribution: Pantropical.

Distribution in Puerto Rico and the Virgin Islands: Dry soils, often on limestone and serpentine, in rocky woodlands, wooded hillsides, thickets, forest trails, scrub forest, grassy slopes, barrens, rocky ravines, and roadsides. Arecibo, Barceloneta, Bayamón, Caja de Muertos, Cayo Ramos, Ceiba, Corozal, Dorado, Fajardo, Guánica, Guayama, Humacao, Isabela, Manatí, Maricao, Mayagüez, Mona Island, Orocovis, Patillas, Peñuelas, Ponce, Rincón, Río Grande, Sabana Grande, Salinas, San Germán, Vega Baja, Vieques, Yabucoa, and Yauco; St. Croix, St. James, St. John, St. Thomas, Tortola, and Virgin Gorda.

Selected specimens examined: PUERTO RICO: Arecibo: Santana, *Vélez 1396* (US). Bayamón: *Liogier 10199* (US). Isabela: Reserva Forestal Bosque Guajataca, La Caballa Trail, *Acevedo-Rdgz. & Siaca 11732* (UPR). Guánica: Guánica Forest along main road to Ranger Station, *Acevedo-Rdgz. & Chinea 3025* (COL, JBSD, MO, US, NY, UPR, US). Mona Island: Camino del Diablo, *Acevedo-Rdgz. et al. 4272* (SJ, US). Peñuelas: *Sintenis 4753* (US). Ponce: 3 mi. W of Ponce, *Heller 6244* (US). Rincón: Puerto Higiero, Atomic Energy Project Grounds, *González-Más 2045* (US). Sabana Grande: Susúa Reserve Forest, *González-Más 2028* (US). San Germán: *Sargent*

489 (US). Vega Baja: *Liogier 9794* (US). Vieques Island: Calabaza to Ensenada, *Shafer 2948* (US). Yabucoa: *Sintenis 4945* (NY, US). Yauco: Susúa Forest Reserve, *Axelrod et al. 4629* (US). St. Croix: District of Queen, Estate, *Proctor 44970* (US); Caledonia Gut, *Fosberg 55396* (US); Signal hill, *A.E. Ricksecker 440* (US). Frederiksted, *Oersted s.n.* (US). St. John: Bethamia to Rosenberg, *N.L. Britton & Shafer 239* (US). St. Thomas: *Oersted s.n.* (US); *Eggers s.n.* (US); Cowells Hill, *Eggers s.n.* (NA); Raccoon Bay, *N.L. Britton et al. 163* (US). Tortola: Scrub Island, *Proctor 46566* (US).

10. Scleria melaleuca Rchb. ex Schltdl. & Cham., Linnaea 6: 29. 1831. Type: Surinam. *Weigelt s.n.* (holotype: G; isotypes: F, G, HAL).

Schoenus latifolius Vahl, Enum. Pl. 2: 226. 1805 [non *Scleria latifolia* Sw., 1788]. Type: Puerto Rico. *Herb. Ventenat s.n.* (holotype: C-Vahl).

Scleria pterota C. Presl in Oken, Isis 21: 268. 1828, *nom. nud.*

Scleria pratensis Lindl. ex Nees in Martius, Fl. Bras. 2(1): 179. 1842. Type: Brazil. *Macrae s.n.* (holotype: probably at CGE).

Scleria ottonis Boeck., Linnaea 38: 490. 1874. Type: Cuba. *Otto 299* (holotype: B, destroyed).

Rhizomatous perennial, (20-) 30-100 (-125) cm tall; rhizome short, horizontally creeping, thickened and nodose, 5-8 mm thick, purplish brown. Culms erect, borne singly along the rhizome, triquetrous, 2.5-5 (-8) mm wide, stiff and hardened, glabrous to sparsely pilose, scabrid on angles distally. Leaves 4-8, the upper ones equaling to exceeding the inflorescence; sheaths inflated towards apex, distal ones wing-angled, septate-nodulose to indistinctly so, retrorsely scabrous on margins, sparsely pilose to glabrous, purple-tinged at base; ligule absent; contraligule triangular, the thickened, cartilaginous margin hispid to glabrescent; blades flat, 20-60 cm × (3-) 5-17 (-19) mm, 5-veined, obscurely septate near base, thin, glabrous or sparsely pilose proximally, antrorsely scabrous on margins and abaxial midvein, the apex short to abruptly acuminate with blunt tip. Inflorescence composed of a single terminal and 1-4 axillary, subcontiguous to remote, narrowly pryamidal partial panicles from the upper leaf-like bracts, the terminal one largest, 4-11 × 1-4 cm; bractlets flattened, falcate, to 2 cm long; panicle branches wing-angled, scabrous on angles, often dark purplish; spikelets unisexual; staminate spikelets 3-5 × 1-1.5 mm; fertile staminate scales oblong-ovate to lanceolate, 3-4 × 1-2 mm; pistillate spikelets elliptic to elliptic-obovoid, subcompressed, 3-4 × 2-3 mm; sterile pistillate spikelet scales 3-4, widely-ovate to ovate-oblate, 2.5-3 × 2-3.5 mm, glabrous, shiny, margins finely ciliate, brown, dark purple distally on sides, carina 1-nerved, prolonged beyond the abruptly acuminate, cuspidate-divergent apex as a short, excurved mucro. Staminate flowers with 1 stamen, the anthers 1-1.3 mm long, with a dark brown, triangular-subulate, bristly apiculum. Achene body depressed-globose to globose, subumbonate, 1.5-2.2 (-2.9) × 2-2.5 mm, shorter than the scales, apiculate, eporose, estipitate, smooth or sometimes with tufts of fine hairs near base, white or variegated with purple; hypogynium 1-1.5 × 1.8-2 mm, 3-lobed, the lobes broadly rounded with entire margins, reflexed.

General distribution: Mexico, Central America, South America, and the West Indies.

Distribution in Puerto Rico and the Virgin Islands: Wet or moist places in wooded hillsides, forest edges, trails in secondary forests, roadsides ditches, roadbanks, grassy slopes, marshy areas, meadows, pastures, stream borders, lake margins, sand savannas, seepage areas, scrub forests, and waste grounds. Adjuntas, Aguas Buenas, Arecibo, Bayamón, Caguas, Canóvanas, Cataño, Cayey, Carolina, Ceiba, Cidra, Corozal, Dorado, Fajardo, Guayama, Guaynabo, Humacao, Isabela, Maricao, Maunabo, Mayagüez, Naguabo, Patillas, Río Grande, San Germán, San Juan, San Lorenzo, San Sebastián, Toa Baja, Trujillo Alto, Utuado, Vega Alta, Vega Baja, and Yabucoa; St. Croix, St. John, St. Thomas, Tortola, and Virgin Gorda.

Common name: Puerto Rico: *Cortadora blanca.*

Selected specimens examined: Puerto Rico: Arecibo: Río Abajo State Forest, *Acevedo-Rdgz. 10554* (UPRRP, US). Canóvanas: Bo. Cubuy, *Trejo et al. s.n.* (UPRRP). Cataño: Bo. Palo Seco, *Axelrod & Díaz 12708* (UPRRP). Cayey: Rd. 184 to Guavate-Carite, km 3.7, *González-Más 1564* (US). Cidra: Pueblo Viejo, *Hioram 93* (US). Humacao: Santa Teresa, *Liogier et al. 31348* (US). Isabela: Bo. Planas, Guajataca Forest Reserve, *Axelrod et al. 11249* (UPRRP). Maricao: Rd. 120,

near San Antonio River, *González-Más 411* (US). Mayagüez: Miradero, near aqueduct, *González-Más 1762* (US). Naguabo: Bo. Florida, Rd. 191, km 27.5, *González-Más 1388* (US); Sierra de Naguabo, along Río Cubuy to Meseta Falls, *Shafer 3154* (US). Río Grande: Along Rt. 186 bordering Caribbean National Forest, *Kelloff et al. 372* (US) San Germán: *Sargent 751* (US); San Juan: Río Piedras, *Stevenson 75* (US); Santurce, *Heller & Heller 15* (US). San Sebastián: *Sargent 239* (US). Utuado: Vicinity of Utuado, *N.L. Britton & Cowell 888* (US). St. Croix: SE ridge, Mt. Eagle, *Fosberg 60776* (US); Lebanon Hill, *A.E. Ricksecker 416* (US). St. John: Bordeaux Mountain, *Woodbury* 57/6543, 58/6544 (VINPS); Bethania to Rosenberg, *N.L. Britton & Shafer 275* (US). St. Thomas: Crown, *N.L. Britton & Marble 1342* (US); Charlotte Amalie, *Millspaugh 506* (US); Signalhill, *Eggers s.n.* (NA); *Eggers s.n.* (US). Tortola: High Bush, *N.L. Britton & Shafer 832* (US).

11. Scleria microcarpa Nees ex Kunth, Enum. Pl. 2: 341. 1837; *Ophryoscleria microcarpa* (Nees ex Kunth) Nees in Martius, Fl. Bras. 2(1): 184. 1842. Type: Surinam. *Weigelt s.n.* (holotype: B, destroyed; isotypes: BM, BR, HAL).

Scleria foliosa C. Wright in Sauvalle, Anales Acad. Ci. Méd. Habana 8: 154. 1871, non Hochstetter ex A. Richard, 1850; *Scleria microcarpa* var. *foliosa* C. B. Clarke in Urban, Symb. Antill. 2: 149. 1900. Type: Cuba. *Wright 3807* (holotype: GH, isotype: NY).

Slender or medium-sized rhizomatous perennial, 55-160 (-210) cm tall; rhizome short to elongate, horizontal, scaly, knotty at culm bases, 3-6 mm thick. Culms erect to bending over at maturity, approximate to remote along rhizome, trigonous proximally, triquetrous distally, smooth and glabrous, scabrid on angles (at least distally), 3-6 mm wide. Leaves 5-8; sheaths winged, glabrous or pubescent, the angles retrorsely scabrous, or often with mixed antrorse and retrorse barbs; ligule absent; contraligule lanceolate, glabrous, with straight veins, the margin ciliate-scabrous to smooth; blades subflattened to plicate, 2-45 cm × 4-13 (-16) mm, glabrous or pubescent, margins, abaxial midvein, and sometimes adaxial lateral veins antrorsely scabrous (at least distally) or with mixed antrorse and retrorse barbs proximally, acuminate or attenuate to blunt, subflattened tip. Inflorescence composed of a single terminal and 1-5 linear to linear-rhombic axillary partial panicles from the upper leaf-like bracts, the terminal one 3-16 × 0.5-1 (-2) cm; bractlets linear-subulate, antrorsely scabrous on margins; branches narrowly winged; spikelets unisexual; staminate spikelets 1.5-2.5 × 0.8-1.3 mm; staminate scales light brown; pistillate spikelets ovate, 2-3 × 1-1.5 mm; sterile pistillate spikelet scales 4, broadly ovate to rounded, curvate-keeled, 0.9-1.4 mm diam., straw-colored to dark brown, reddish brown lineolate, carina 1-nerved, shortly prolonged at acute apex. Staminate flower with 3 stamens, the anthers 0.7-1.1 mm long, with a triangular-subulate, prickly apiculum. Achene body ovoid to ellipsoid-ovoid, 1-1.8 × 1.2-1.9 mm, slightly compressed, obtuse to sub-rounded at apex, estipitate, eporose, smooth, glabrous, white or greenish; style base persistent, short-conic, 0.3-0.5 × 0.2-0.3 mm, brown, finely antrorsely scabrid; hypogynium 3-lobed, adhering to and hidden by the spongy-thickened, tan to yellowish, dark brown mottled, shallowly 3-lobed cupula, 0.8-1.3 × 1.3-2 mm, which is finely ciliate on its rim, the hairs whitish or yellow-brown.

General distribution: Southern Mexico, Central America, West Indies, Trinidad, and South America.

Distribution in Puerto Rico: In wet or moist often sandy soils in forest edges, second-growth forests, forest openings, marshy areas, lake borders, creek and stream edges, trails, scrubs, thickets, savannas pastures, and roadside ditches. Arecibo, Cabo Rojo, Carolina, Dorado, Fajardo, Florida, Luquillo, Manatí, Mayagüez, Naguabo, Patillas, Río Grande, San Juan, Toa Baja, Utuado, Vega Alta, and Vega Baja.

Selected specimens examined: Puerto Rico: Cabo Rojo: *Sintenis 78 b* (US). Dorado: Bo. Higuillar, just E of Aeropuerto de Dorado, *Proctor 42447* (US). Río Grande: Luquillo Mountains, *Wilson 218* (US). San Juan: Stone quarry 2 mi. E of Santurce, *Heller & Heller 1362* (US); Río Piedras, *Stevenson 3651* (US). Toa Baja: Sabana Seca, Primate Research Center, *Trejo 1107* (UPRRP). Vega Baja: Tortuguero Lake, *González-Más 2160* (US). Bo. Puerto Nuevo, *González-Más 1094* (US).

12. Scleria mucronata Poir. in Lamarck, Encycl. 7: 3. 1806. Type: Puerto Rico. *Ledrú 83 p.p.* (holotype: P!; isotype: P).

Scleria cubensis Boeck., Beitr. Cyper. 2: 42. 1890. Type: Cuba. *Eggers 5113* (holotype: B, destroyed; isotype: P)

Scleria microcarpa var. *subeciliata* C. B. Clarke in Urban, Symb. Antill. 2: 149. 1900. Lectotype: Jamaica. *Hart 674* (US!), here designated.

Scleria catalinae Britt., Bull. Torrey Bot. Club 42: 489. 1915. Type: Cuba. *Van Hermann 3272* (holotype: NY).

Coarse, rhizomatous perennial, 150-250 cm tall; rhizome thick and hardened, nodose. Culms erect, sharply trigonous to triquetrous distally, 3-9 mm wide, glabrous, smooth proximally, scabridulous on sides and angles distally. Leaves 6-8; sheaths unwinged or only very narrowly so, scabrid to smooth on angles, glabrous; ligule absent; contraligule triangular or narrowly so, with rounded tip, glabrous, the margin thickened, often crenulate; blades subflattened or plicate, 30-80 cm × 9-37 mm, adaxial and abaxial surfaces glabrous, margins, abaxial midvein, and abaxial lateral nerves finely antrorsely scabrous to essentially smooth, abruptly narrowed at base, not decurrent or only very narrowly so along the lateral margins of the sheath, acuminate or subattenuate to subflattened, blunt tip. Inflorescence composed of a terminal and series of 2-4 narrowly rhombic, axillary partial panicles from the upper leaf-like bracts, the terminal one largest, 9-28 × 2-6 (-8) cm; bractlets linear, scabrid on angles; panicle branches finely pubescent to glabrous; spikelets unisexual; staminate spikelets ovate to ovate-elliptic, 2.5-3.5 × 1-1.5 mm; staminate scales brown to light reddish brown, grayish puberulent; pistillate spikelets ovoid, 2-3 mm long; sterile pistillate spikelet scales 4, ovate-orbicular, the uppermost 2.5-3 mm in diam, brown, grayish puberulent to glabrous, finely brown-lineolate, carina 1-nerved, shortly prolonged beyond the acute to broadly acute apex. Staminate flower with 2-3 stamens, the anthers 1-1.3 mm long, with a triangular-subulate, bristly apiculum. Achene body ovoid to subglobose or globose, 1.8-2.2 × 2.1-2.5 mm, rounded to obtusely so or truncate at apex, smooth, glabrous, white to grayish white or blue-green, estipitate, eporose; style base persistent, conic-cylindrical, 0.6-1 × 0.5-0.6 mm, finely reticulate, smooth or essentially so; hypogynium 3-lobed, adhering to and hidden by the spongy-thickened, tan to yellowish, smooth, shallowly 3-lobed cupula, 1.3-1.5 × 2.2-2.7 mm, which is sparsely and inconspicuously ciliate on its rim, the hairs very short and fine.

General distribution: Cuba, Hispaniola, Jamaica, and Puerto Rico.

Distribution in Puerto Rico: Montane forests on lateritic soils and on serpentine substrate at Maricao; wet or damp areas on forest edges, trails, glades, river banks, creek margins, rocky slopes and ravines, thickets, hillsides, and roadbanks. Barranquitas, Cayey, Juana Díaz, Maricao, Naguabo, Río Grande, and Villalba.

Selected specimens examined: Puerto Rico: Barranquitas: *Sargent 362* (US); La Torrecilla, *Axelrod et al. 5327* (US); Monte Torrecilla, *N.L. Britton et al. 5536* (US). Maricao: Bo. Indiera Fría, along track near Río Lajas, *Proctor & Padrón 45677* (US). Naguabo: Sierra de Luquillo: Summit of Loma La Mina to Río Blanco, *Shafer 3384* (US). Río Grande: El Yunque, *Sargent 544* (US). Villalba: near Salto Doña Juana, *González-Más 2195, 2196* (US). Juana Díaz: *Sargent 3198* (US).

13. Scleria muehlenbergii Steud., Nomencl. Bot., ed. 2, 2: 543. 1841; *Scleria laxa* Torr., Ann. Lyceum Nat. Hist. New York 3: 376. 1836, non R. Brown, 1810. Type: United States; South Carolina. Collector unknown (holotype: PH).

Scleria hemitaphra Steud., Syn. Pl. Glumac. 2: 169. 1855. Type: United States; Louisiana, *Drummond Herb. s.n.* (holotype: probably at P).

Scleria reticularis var. *pubescens* Britton, Ann. New York Acad. Sci. 3: 232. 1884. Type: Cuba. *C. Wright 3800* (holotype: NY!; isotypes: GH, US!)

Scleria stevensiana Britton, Bull. Torrey Bot. Club 50: 55. 1923. Type: Puerto Rico; Lares. *Steven & Hess 4944* (holotype: NY!).

Scleria setacea sensu many authors, non Poiret, 1806.

Slender to medium-sized, caespitose perennial, 20-80 (-100) cm tall; rhizome short, nodose, 1-2 mm thick. Culms erect or ascending, triquetrous, retrorsely scabrid to smooth on angles, otherwise glabrous, 0.8-2.3 mm wide, to 0.5 mm wide distally. Leaves 2-5 (excluding upper leaf-

like panicle bracts, remote; sheaths inflated, narrowly winged, often hirsute proximally, remotely cross-veined, retrorsely ciliate-scabrid on angles, purplish proximally; ligule absent; contraligule obtuse to rounded, with straight veins, the margin with a short scarious appendage; blades subflattened to plicate, 4-30 (-37) cm × (1.4-) 1.7-4 (-5) mm, glabrous or nearly so, margins and abaxial midvein antrorsely scabrid, the apex acuminate or attenuate to blunt tip. Inflorescence composed of a terminal and series of 2-4 narrow partial panicles from the upper leaf-like bracts, on short to elongate peduncles, the terminal one 1.5-3 (-5) × 0.6-1.8 cm; spikelets unisexual; staminate spikelets 2.5-3.5 × 0.7-1 mm; staminate scales light brown to dark reddish brown; pistillate spikelets ovoid-lanceoloid, 4-6 × 1-1.7 mm; sterile pistillate spikelet scales 3, ovate to ovate-lanceolate, 2.7-4.5 × 2-2.5 mm, light brown to dark reddish brown or purplish, carina 1-nerved, antrorsely scabrous distally, prolonged beyond the acuminate apex as a mucro. Staminate flower with 2 stamens, the anthers 0.8-1.4 mm long, with a prickly apiculum. Achene body broadly ovoid to subglobose, 1.7-2.5 × 1.5-2 mm, irregularly reticulate-pitted or papillose-reticulate, with dense to sparse tufts of minute rusty hairs on the ridges, dingy white or grayish, estipitate, the apex rounded, abruptly apiculate; style base deciduous; hypogynium deeply 3-lobed, 0.7-1 × 1.2-1.5 mm, the lobes oblong, concave with a low ridge medially, appressed to base of achene body, with an acute to attenuate tooth at apex.

General distribution: United States, Central America, West Indies, Trinidad, and South America.

Distribution in Puerto Rico: On moist or wet sands around pond margins, savannas and savanna-like swales, and roadsides. Aguada, Añasco, Dorado, Manatí, Moca, Rincón, Vega Alta, and Vega Baja.

Note: Scleria muehlenbergii has been treated by many authors as a synonym of the closely related *S. reticularis* Michx. However, a recent proposal (Camelbeke, Reznicek, & Goetghebeur, Taxon 52: 355. 2003) was made to conserve the name *Scleria reticularis* Michx. with a conserved type based on a discovery that the type material of that name is referable to a different species, *Scleria triglomerata* Michx. If the proposal is accepted by the spermatophyte committee, the proposed type will fix the name in a strict sense to apply to an element which is restricted to the eastern United States. After examining the specimen proposed for conservation (North Carolina. *Leblond 1651* (NCU) and other material of *S. reticularis* sensu stricto, we concluded that this taxon was not conspecific with the Puerto Rican material which we are here applying in the strict sense to the more widespread *S. muehlenbergii*.

Selected specimens examined: Puerto Rico: Aguada: *Sargent 596* (US). Dorado: Vicinity of Dorado, *N.L. Britton et al. 6654* (US). Manatí: Laguna Tortuguero, May 1960, *Woodbury s.n.* (US). Vega Alta: Bo. Sabana, *Proctor et al. 44146* (US). Vega Baja: Bo. Algarrobo, just S of Laguna Tortuguero, *Proctor et al. 45030* (US).

14. Scleria scindens Nees ex Kunth, Enum. Pl. 2: 343. 1837. Type: Martinique. *Kohaut 269* (holotype: probably at AWH).

Scleria chlorantha Boeck., Linnaea 38: 506. 1874. Type: Dominican Republic. *Mayerhoff s.n.* (holotype: B, destroyed).

Scleria scaberrima Boeck., Beitr. Cyper. 2: 41. 1890. Type: St. Vincent. *Eggers s.n.* (holotype: B, destroyed).

Fig. 56. C-E

Robust perennial, 0.5-3.5 m tall, often growing in large colonies; rhizome stout, nodose. Culms erect or ascending, vine-like and clambering, solitary from nodes of the rhizome, sharply 3-angled, (2-) 3.2-8 cm wide, mixed retrorsely-antrorsely scabrid on angles, sparsely strigose on sides, glabrescent at base. Leaves numerous, overtopping the inflorescence; sheaths subloose, inflated near summit, appressed-strigose, glabrescent; ligule absent; contraligule convex to truncate, with straight veins, the margin cartilaginous, often ciliate; blades subflattened or plicate, 30-90 cm × 5-15 mm, obscurely septate, stiff, somewhat coriaceous, blunt to sharply retrorsely scabridulous on margins and abaxial midvein, the apex acuminate to subflattened, blunt tip. Inflorescence composed of a single, dense, pyramidal panicle, 3-8 (-10) cm diam., or sometimes with 1 or 2 additional smaller panicles in the axils of the upper leaf-like bracts; bracts subtending the terminal panicle typically 3, overtopping the inflorescence; bractlets setaceous, ciliate-scabrous; panicle branches minutely pubescent, glabrescent; staminate spikelets

narrowly oblong-ovoid, cylindrical to slightly compressed, ca. the same length as the pistillate; staminate scales many, the 2-3 at base sterile, like the pistillate, 3-4 × 2-3 mm; pistillate spikelets ovoid-elliptic, 4-5 × 2-3 mm, spreading with developing achene; sterile pistillate spikelet scales 4, ovate-orbicular, the uppermost one 3.5-4 mm in diam., cupuliform, glabrescent, green, finely reddish brown lineolate, ciliate on margins, carina 1-nerved, mucronate at the short-acuminate to acute apex. Staminate flowers with 3 stamens, the anthers 1.8-2.2 mm long, with a triangular-subulate, prickly apiculum. Achene body globose, 2.3-2.6 × 2.3-2.7 mm, minutely apiculate, shiny white to purple-tinged; hypogynium 1-1.7 × 2.3-2.7 mm, 3-lobed, with weakly revolute, rounded, entire, spreading to divergent lobes which are not appressed to base of achene body.

General distribution: Cuba, Hispaniola, Virgin Islands, and the Lesser Antilles.

Distribution in the Virgin Islands: Secondary vegetation along roadsides, edges of forested areas, hillsides, and streams. St. John, Tortola, and Virgin Gorda.

Common name: Virgin Islands: *Razor-grass*.

Selected specimens examined: ST. JOHN: Coral Bay Quarter; along dirt road to Bordeaux Mountain, *Acevedo-Rdgz. et al. 5102* (K, MO, NY, UPRRP, US). TORTOLA: Sage Mountain, *Fishlock 91, 379* (NY); High Bush, *N.L. Britton & Shafer 822* (NY, US).

15. Scleria secans (L.) Urb., Symb. Antill. 2: 169. 1900; *Schoenus secans* L., Syst. Nat. ed. 10: 865. 1759. Lectotype: Jamaica. Sloane, *Voy. Jamaica 1: t. 77, f. 1. 1707*, designated by T. Koyama in R.A. Howard, Fl. Lesser Antill. 3 : 309. 1979.

Scleria reflexa Kunth in Humb., Bonpl., & Kunth., Nov. Gen. Sp. 1 [quarto ed.]: 232. 1816; *Mastigoscleria reflexa* (Kunth) Nees in Martius, Fl. Bras. 2(1): 177. 1842. Type: Venezuela. *Humboldt & Bonpland s.n.* (holotype: P).

Scleria flagellum sensu many authors, non Swartz, 1788.

Fig. 56. F, G

Vine-like, rhizomatous perennial, elongating to 5-10 m, often forming dense thickets; rhizome coarse, knotty. Culms scandent, scrambling and climbing over secondary vegetation, frequently branched from upper nodes, trigonous proximally, triquetrous distally, often hirsute on sides medially to glabrous, retrorsely spinulose on angles, 1.8-4 mm wide, to 6 mm wide at base. Leaves numerous; sheaths tight, unwinged or essentially so, hirsute medially, the angles smooth or retrorsely spinulose; ligule a dense band of hairs; contraligule deltate with obtuse apex, often densely hirsute with whitish trichomes, the margin often bearing a broad scarious appendage with anastomosing veins, or sometimes wanting; blades plicate or subflattened, 10-40 cm × 2-7 mm, adaxial surface hirsute at base, abaxial surface sparsely hirsute to glabrous, margins, abaxial midvein, and often adaxial main lateral nerves retrorsely spinulose, gradually tapering to and attenuate, subflattened apex. Inflorescence composed of a terminal and series of 1-3, axillary, pyramidal partial panicles, from the upper leaf-like bracts, the terminal one largest, 2.5-6 (-8) × 1.3-4.5 cm, the lower becoming successively smaller or wanting; bractlets and rachis ciliate-hirsute on margins or angles; spikelets unisexual; staminate spikelets 3-4.5 × 0.8-1.2 mm; proximal staminate scales greenish, stained with reddish or blackish purple on margins and sometimes sides distally; pistillate spikelets ovoid, 5-8 × 1.5-2 mm (spreading to 5 mm with developing achene); sterile pistillate spikelet scales 4, ovate to ovate-lanceolate, 2.5-6 × 2-4 mm, light brown to brown, reddish or blackish purple on margins and sometimes sides distally, carina 1-nerved (at least distally), mucronate at the acute to acuminate apex. Staminate flowers with 3 stamens, the anthers 2-2.5 mm long, with a lanceolate-setaceous appendage at apex, often bearing some appressed trichomes. Achene body ovoid to oblong-ovoid, rounded, 2.8-4 × 2.4-2.9 mm, obtuse at apex, white or sometimes green-mottled, smooth, glossy, glabrous or essentially so, estipitate, eporose; style base deciduous or its base sometimes persisting as a bulbous, antrorsely scabrid tubercle; hypogynium discoid, obscurely 3-lobed, 0.3-1 × 1.5-2 mm, the lobes entire, reflexed, irregularly wrinkled, reddish lineolate.

General distribution: Mexico, Central America, West Indies, Trinidad, Tobago, and South America.

Distribution in Puerto Rico: Secondary thickets in openings, along trails, and borders of

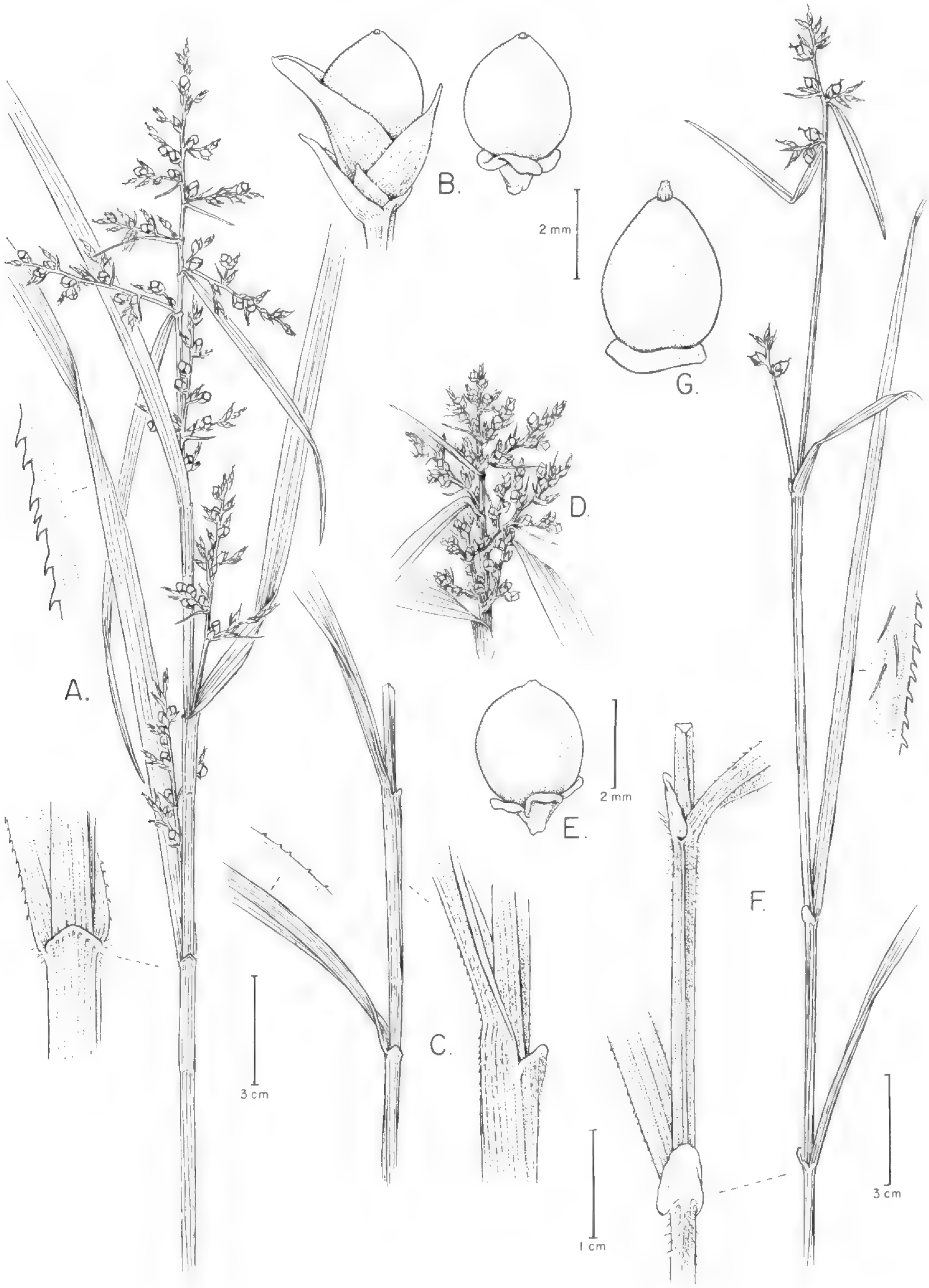


Fig. 56. A-B. *Scleria canescens.* **A.** Fertile branch, with details of the node and leaf margin. **B.** Achene with scales and achene showing hypogynium. **C-E.** *Scleria scindens.* **C.** Branch, showing detail of the node. **D.** Inflorescence. **E.** Achene showing hypogynium. **F-G.** *Scleria secans.* **F.** Fertile branch, with detail of the node. **G.** Achene with hypogynium. From Acevedo-Rdgz., P. 2003, Bejucos y plantas trepadoras de Puerto Rico e Islas Vírgenes, Smithsonian Institution.

lower montane forest, 440-700 m elevation. Also collected at Laguna Tortuguero (no Municipality given) by *Woodbury s.n.*, 3 Mar 1960 (UPR). Bayamón, Caguas, Cayey, Guayama, Luquillo, Patillas, and Río Grande.

Common name: Puerto Rico: *Cortadora de altura.*

Selected specimens examined: PUERTO RICO: Bayamón: Bo. Guaraguao Arriba, *Proctor 41703* (SJ). Caguas: *Kuntze 316* (NY); *N.L. Britton & Cowell 1402* (US, NY). Cayey: Sierra de Cayey, Bo. Guavate, *Proctor 47938* (SJ). Guayama: Carite Forest Reserve, *Axelrod et al. 609* (UPRRP). Luquillo: Bo. Sabana, Caribbean National Forest, *Axelrod* 5848 (UPRRP). Patillas: on property of Tropic Ventures, *Taylor 7847* (UPRRP); Carite Forest Reserve, Rt. 184, *Axelrod* 5873 (UPRRP). Río Grande: Sierra de Luquillo, *Proctor & Alemany 47720* (SJ).

16. Scleria verticillata Muhl. ex Willd., Sp. Pl. 4: 317. 1805; *Hypoporum verticillatum* (Muhl. ex Willd.) Nees, Linnaea 9: 303. 1834. Type: United States; Pennsylvania. *Willdenow s.n.* (holotype: B-Willd. 17326).

Slender caespitose annual, 10-70 cm tall, with aromatic roots. Culms ascending to erect, triquetrous to subtrigonous with smooth, pale rib-angles, firm, flexuous, glabrous, 0.4-2 mm wide. Leaves 5-8 per culm; sheaths elongate, unwinged, subloose, glabrous to sparsely pilose, the basal ones often reddish purple or purple-black; ligule absent; contraligule small, truncate or slightly convex, hirsute or glabrous, or wanting; blades plicate to subflattened, 3-30 cm × 0.7-3 mm, glabrous, margins and abaxial midvein smooth proximally, finely antrorsely scabrous distally, attenuate to apex. Inflorescence terminal, interruptedly glomerate-spicate, unbranched or sometimes with 1-2 lateral branches present, composed of 3-10 (-15), sessile fascicles of spikelets; bractlets filiform, glabrous; rachis narrowly wing-angled; fascicles 3-7 mm diam., erect or patent, not reflexed; spikelets bisexual (androgynous), 2.5-4 × 1-2 mm; staminate scales lanceolate; sterile pistillate spikelet scales 3, ovate-lanceolate to oblong-lanceolate, 2.2-3 × 0.8-1.2 mm, glabrous, stramineous or purplish, carina 3-nerved, greenish, prolonged beyond the acuminate-cuspidate apex as an excurved mucro. Staminate flower with 1 stamen, the anther 1-1.5 mm long, with a lanceolate-subulate prickly apiculum. Achene subglobose to depressed globose, 1-1.5 × 1-1.3 mm, verrucose, rounded to subtruncate at apex, apiculate, 4- or 5-porose on each side basally, glabrous, white to grayish or purple-tinged, with a trigonous, stipe-like base bearing a depression between the costae on each side, the very base, just above attachment, with a narrow, greenish or reddish cellular-reticulate band on each side; style base deciduous; hypogynium absent.

General distribution: United States, Mexico, Central America, West Indies, and South America.

Distribution in Puerto Rico: Wet sands in savanna-like swales or seasonal pools. Manatí and Vega Baja. Known to occur only in the vicinity of Laguna Tortuguero.

Selected specimens examined: PUERTO RICO: Without locality, 1970, *Woodbury s.n.* (US).

Excluded species

Scleria bracteata Cav., Icon. 5: 34. 1799. Reported for Puerto Rico by Kartesz (1998) in "A Synonymized Checklist of the Vascular Flora of the United States, Puerto Rico, and the Virgin Islands" (http://www.csdl.tamu. edu/FLORA/b98/check98.htm). This record was based on a pers. comm. from John Fairey (CLEM) in a letter to John Kartesz dated May 11, 1979. No specimens were seen during the preparation of this treatment nor has it been recently collected in the flora area.

Scleria mitis P. J. Bergius, Kongl. Vetensk. Acad. Handl. 26: 145. 1765. Cited for Puerto Rico by Core (1936) based on *Sintenis 1215* (US). However, two sheets of this collection seen are both clearly *Scleria eggersiana* Boeck. Even though one of the specimens has immature achenes, the cilia along the margin of the hypogynium are brown and the style base is finely antrorsely scabrid, characteristic of *S. eggersiana*. *Scleria mitis* has dense, black cilia on the margin of the hypogynium and coarse, appressed, retrorse black trichomes on the style base. Urban (1903) cites *Sintenis 1714* and *6639*, and *Eggers & Rensch 1180b* as *S. mitis* from Puerto Rico. *Sintenis 1714* and *1215* are *S. eggersiana*. *Sintenis 6639* and *Eggers & Rensch 1180b* were not seen. No collections of this species from Puerto Rico and the Virgin Islands were

seen during the preparation of this treatment nor has it been recently collected in the flora area.

Scleria oligantha Michx., Fl. Bor.-Amer. 2: 167. 1803. Cited for Puerto Rico by Liogier & Martorell (1982: 221; 2000: 246). No specimens were seen during the preparation of this treatment nor has it been recently collected in the flora area.

Scleria pauciflora Muhl. ex Willd., Sp. Pl. 4: 318. 1805. Cited for Puerto Rico by Liogier & Martorell (1982: 221; 2000: 246). No specimens are known to substantiate this record. Records of this species are probably based on misidentifications of specimens of *Scleria brittonii* Core at UPR.

Scleria purdiei C. B. Clarke, Kew Bull. Addit. Ser. 8: 57. 1908. Reported for Puerto Rico by Kartesz (1998) in "A Synonymized Checklist of the Vascular Flora of the United States, Puerto Rico, and the Virgin Islands" (http://www.csdl.tamu.edu/FLORA/b98/check98.htm). This record was based on a pers. comm. from John Fairey (CLEM) in a letter to John Kartesz dated May 11, 1979. No specimens were seen during the preparation of this treatment nor has it been recently collected in the flora area.

Scleria scabriuscula Schltdl., Linnaea 20: 544. 1847. Reported for Puerto Rico by Kartesz (1998) in "A Synonymized Checklist of the Vascular Flora of the United States, Puerto Rico, and the Virgin Islands" (http://www.csdl.tamu.edu/FLORA/b98/check98.htm). This record was based on a pers. comm. from John Fairey (CLEM) in a letter to John Kartesz dated May 11, 1979. No specimens were seen during the preparation of this treatment nor has it been recently collected in the flora area.

Scleria triglomerata Michx., Fl. Bor.-Amer. 2: 168. 1803. Records of this species are based on misidentifications of *Scleria havanensis* Britton.

EXCLUDED GENERA

Isolepis disticha Boeck., Flora 41: 415. 1858. (syn: *Scirpus subdistichus* Boeck. which is a later name based on the same collection). The identity of this taxon, based on *Bertero 248* (B) from St. Thomas, is unknown. According to Britton & P. Wilson (1923), C. B. Clarke examined the specimen and thought it might perhaps be *Scirpus cernuus* Vahl (*Isolepis cernua* (Vahl) Roem. & Schult.), a plant otherwise not known to occur in the West Indies. This plant was described as having subdistichous spikelet scales, while *I. cernua* has spirally imbricate spikelet scales. In their list of *nomina exclusa*, Muasya and Simpson (2002) indicate that the taxon is a *Bulbostylis*. As to description, this plant fits *Bulbostylis pauciflora* quite well except that the achene of *Scirpus subdistichus* is described as having a short, hard mucro at its apex and there is no mention of the leaves having a pilose sheath apex. *Bulbostylis* achenes typically have a persistent, bulbous style base at apex and the leaf sheaths have pilose apicies. The description of the achene as described for *Scirpus subdistichus* better fits *Cyperus* which typically has distichous spikelet scales, a puncticulate achene epidermis, and an apiculate achene apex.

Family 33. **TYPHACEAE** *Cat-tail Family*

Typhaceae Juss., Gen. Pl. 25. 1789, *nom. conserv.*

by G. R. Proctor and M. T. Strong

Tall, erect, perennial, monoecious herbs of marshy or aquatic habitats, with creeping rhizomes and erect stems and leaves. Leaves basal, long-linear, alternate, distichous, sheathing at base, glabrous. Flowers unisexual and densely arranged in separate cylindrical spikes on the same stalk, the staminate

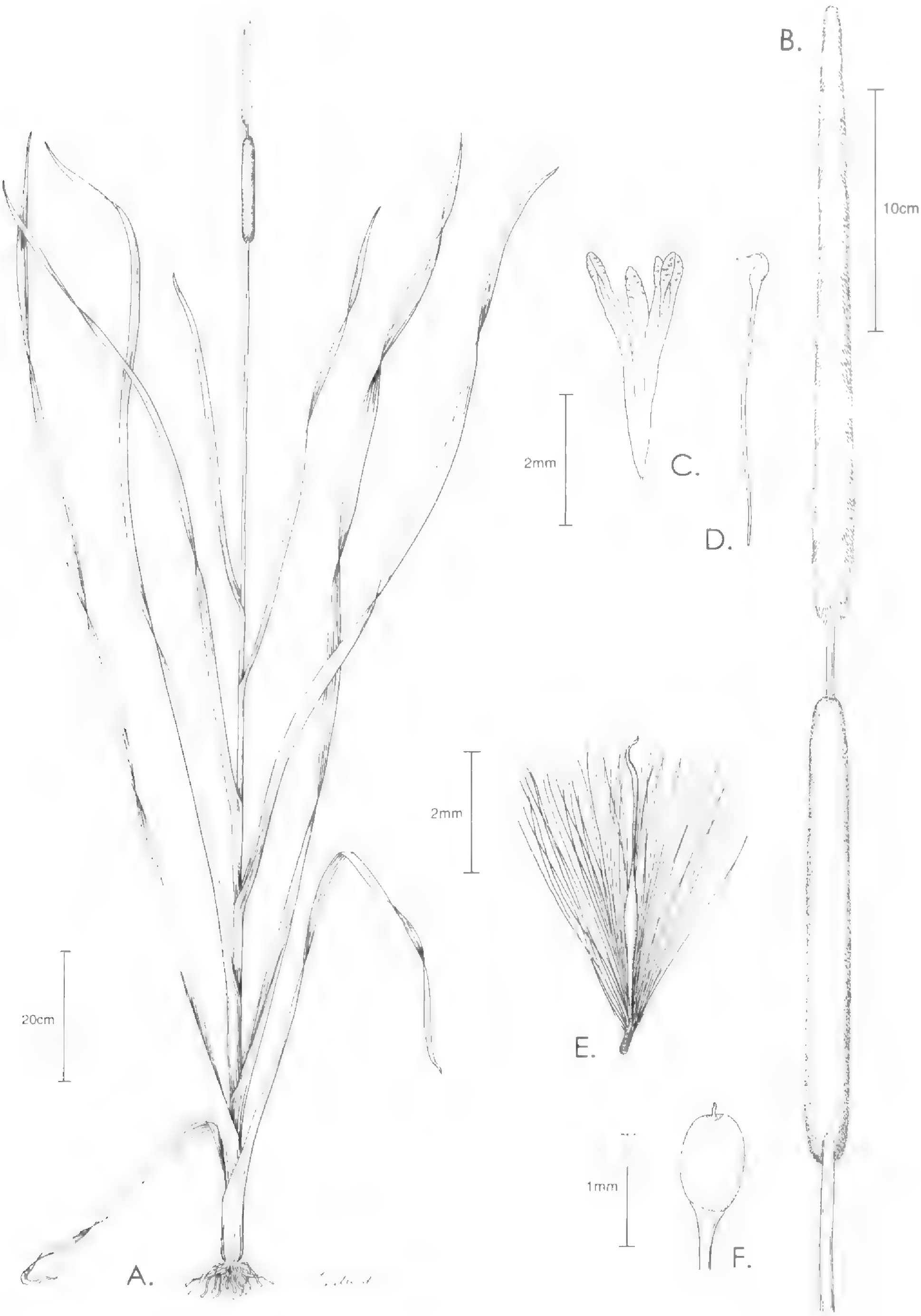


Fig. 57. A-F. *Typha domingensis*. **A.** Habit. **B.** Inflorescence. **C.** Cluster of young anthers. **D.** Bract. **E.** Fertile pistillate flower. **F.** Fertile ovary. (A, B, D, E, and F, from *Proctor 50610*; C, from *Proctor 46202*).



Fig. 58. A. *Podocarpus coriaceus*, fruit. **B.** *Pinus caribaea*. **C.** *Zamia amblyphyllidia*. **D.** *Zamia portoricensis*. **E.** *Alocasia macrorrhizos*. **F.** *Alocasia plumbea*. **G.** *Anthurium crenatum*, habit. (A-E, G, unvouchered; F, from *Acevedo-Rdgz. 13377*). All photos by P. Acevedo-Rdgz.



Fig. 59. A. *Anthurium crenatum*, infructescence **B.** *Anthurium* × *selloum*. **C.** *Colocasia esculenta*. **D.** *Dieffenbachia seguine*. **E-F.** *Dracontium asperum*. **E.** Habit. **F.** Inflorescence. **G-H.** *Xanthosoma sagittifolium*. **G.** Leaf. **H.** Inflorescence. **I.** *Xanthosoma undipes*. (A, from *Acevedo-Rdgz. 2857*; B, from *Acevedo-Rdgz. 3810;* C, unvouchered; D, from *Acevedo-Rdgz. 13418*; E-F, from *Acevedo-Rdgz. 13402*; G-H, from *Acevedo-Rdgz. 13414*; I, from *Acevedo-Rdgz. 13413*). All photos by P. Acevedo-Rdgz.

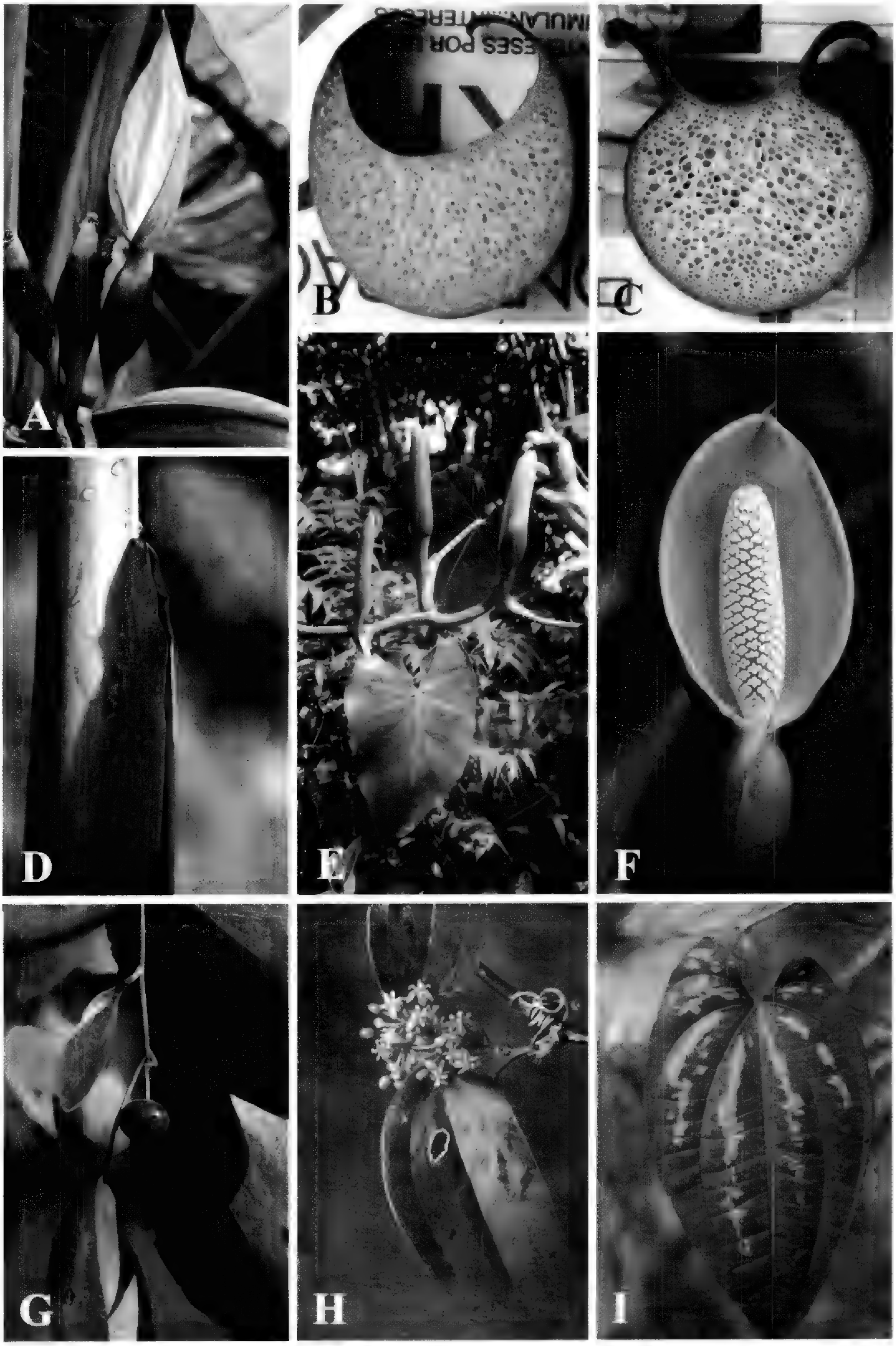


Fig. 60. A-B, D. *Xanthosoma undipes*. **A.** Detail of inflorescence. **B.** Cross section of petiole at invagination area. **D.** Base of petiole showing invagination. **C.** *Xanthosoma violaceum*, cross section of petiole at invagination area. **E.** *Philodendron hederaceum*. **F.** *Syngonium podophyllum*, inflorescence. **G.** *Smilax domingensis*, fruit. **H.** *Smilax coriacea*, inflorescence. **I.** *Rajania cordata*, leaf. (A, from *Acevedo-Rdgz. 13413*; B and D, from *Acevedo-Rdgz. 13752*; C, from *Acevedo-Rdgz. 13753*; E, from *Acevedo-Rdgz. 2880*; F, from *Acevedo-Rdgz. 4061*; G, from *Acevedo-Rdgz. 6341*; H, from *Acevedo-Rdgz. 9330*; I, unvouchered). All photos by P. Acevedo-Rdgz.

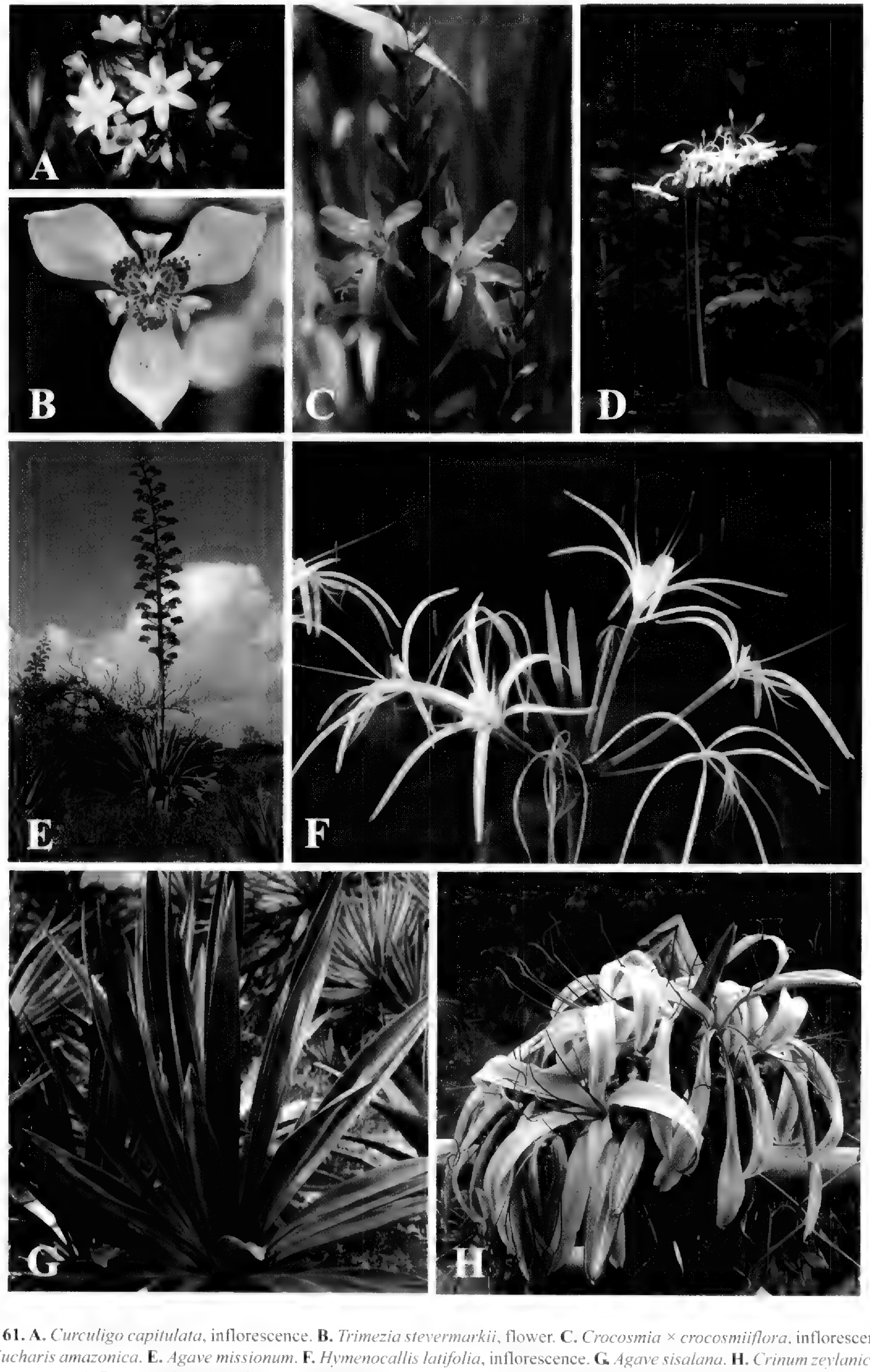


Fig. 61. A. *Curculigo capitulata*, inflorescence. **B.** *Trimezia stevermarkii*, flower. **C.** *Crocosmia* × *crocosmiiflora*, inflorescence. **D.** *Eucharis amazonica*. **E.** *Agave missionum*. **F.** *Hymenocallis latifolia*, inflorescence. **G.** *Agave sisalana*. **H.** *Crinum zeylanicum*, inflorescence. (A-B, unvouchered; C, from *Acevedo-Rdgz. 9424*; D, from *Acevedo-Rdgz. 9394*; E, unvouchered; F, from *Acevedo-Rdgz. 14051*; G-H, unvouchered). All photos by P. Acevedo-Rdgz.

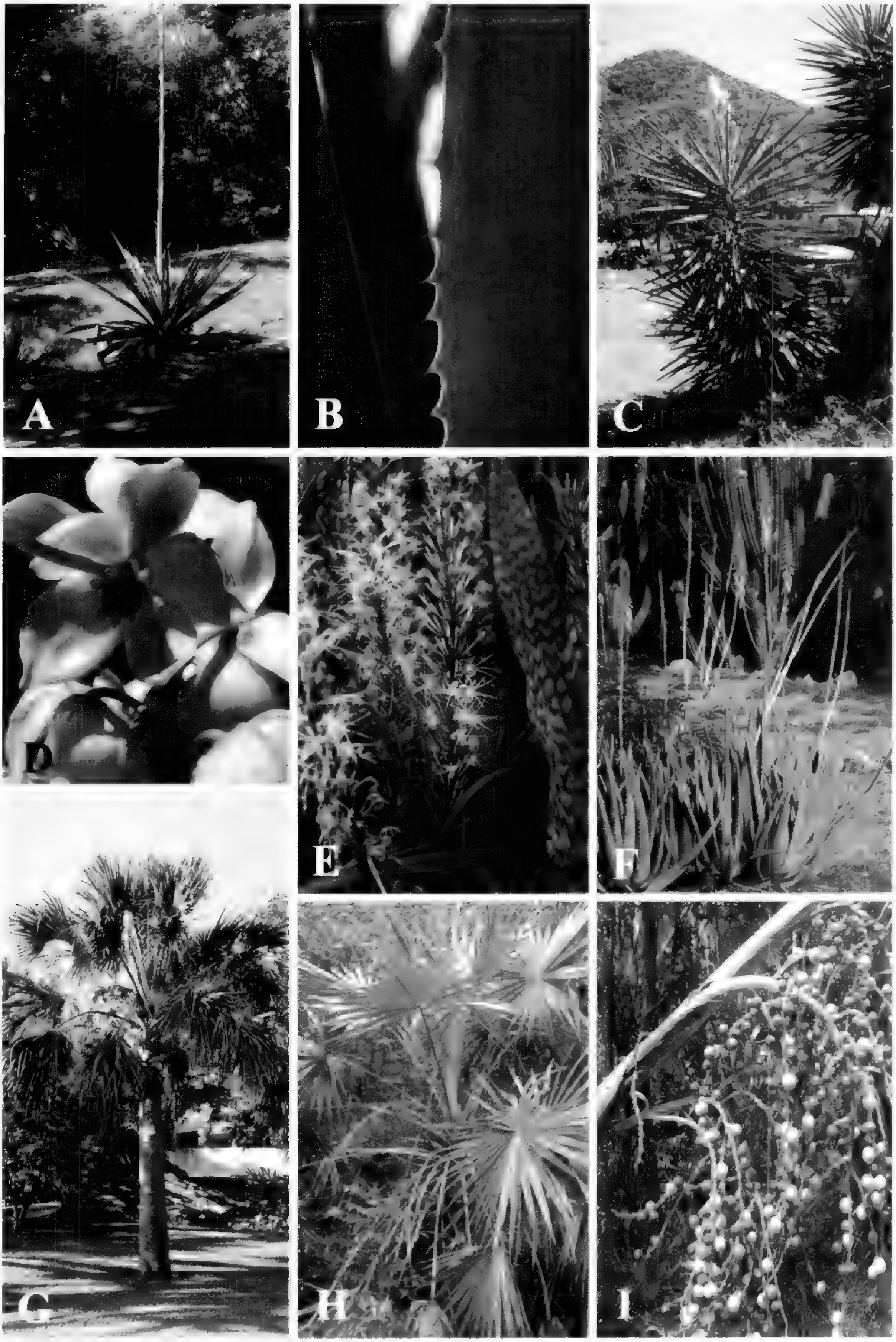


Fig. 62. A-B. *Furcraea tuberosa*. **A.** Habit. **B.** Leaf margin. **C-D.** *Yucca aloifolia*. **C.** Habit **D.** Flowers. **E.** *Sansevieria hyacinthoides*. **F.** *Aloe vera*. **G.** *Sabal causiarum*. **H-I.** *Thrinax morrisii*. **H.** habit. **I.** Inflorescence. (A-B, unvouchered; C-D, from *Acevedo-Rdgz. 2008*; E, from *Acevedo-Rdgz. 3859*; F-I, unvouchered). All photos by P. Acevedo-Rdgz.



Fig. 63. A. *Aploleia monandra*, flower. **B.** *Gibasis geniculata*. **C.** *Tripogandra serrulata*, inflorescence. **D.** *Xiphidium caeruleum*. **E.** *Eichhornia crassipes*, inflorescence. **F.** *Pontederia cordata*. **G.** *Musa* group ABB "mafafo". **H.** *Musa* group AAB "manzano". **I.** *Heliconia caribaea*, inflorescence. (A, from *Acevedo-Rdgz. 7911*; B, from Acevedo-Rdgz. 13409; C, from *Acevedo-Rdgz. 10760*; D-I, unvouchered). All photos by P. Acevedo-Rdgz.





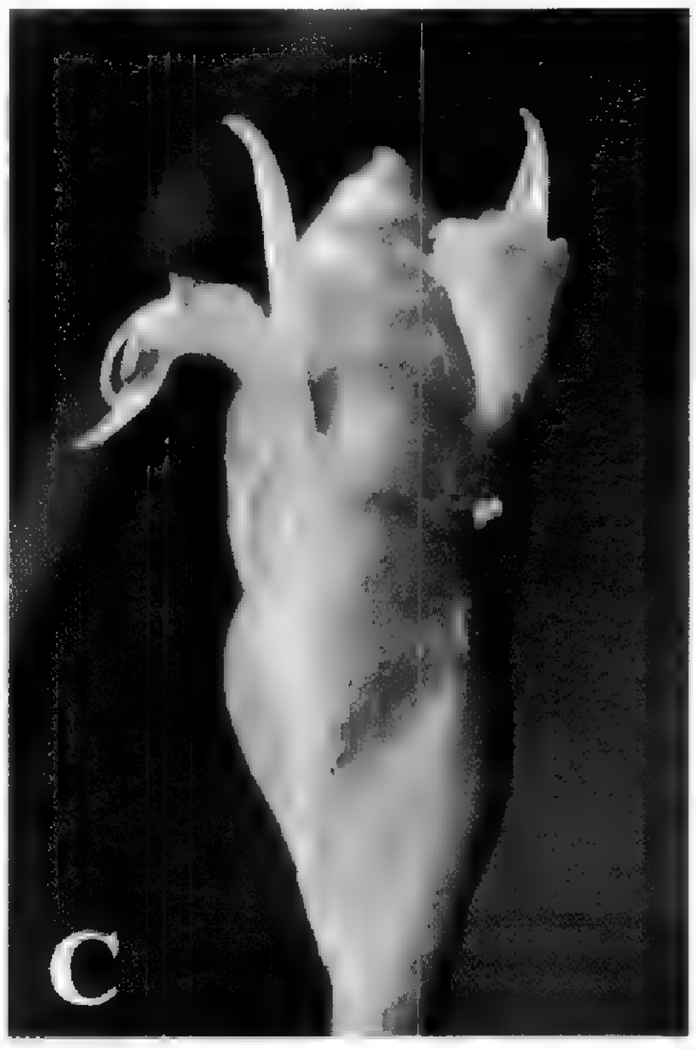












Fig. 64. A. *Alpinia zerumbet*, inflorescence. **B.** *Alpinia purpurata*, inflorescence. **C.** *Zingiber zerumbet*, inflorescence. **D.** *Hedychium coronarium*, flowers. **E.** *Renealmia jamaicensis* var. *puberula*, inflorescence. **F.** *Costus speciosus*, inflorescence. **G.** *Canna indica*. **H.** *Calathea lutea*. (A-B, unvouchered; C, from *Acevedo-Rdgz. 13419*; D, unvouchered; E, from *Acevedo-Rdgz. 6224*; F, unvouchered; G, from *Acevedo-Rdgz. 10705*; H, from *Acevedo-Rdgz. 10767*). All photos by P. Acevedo-Rdgz.

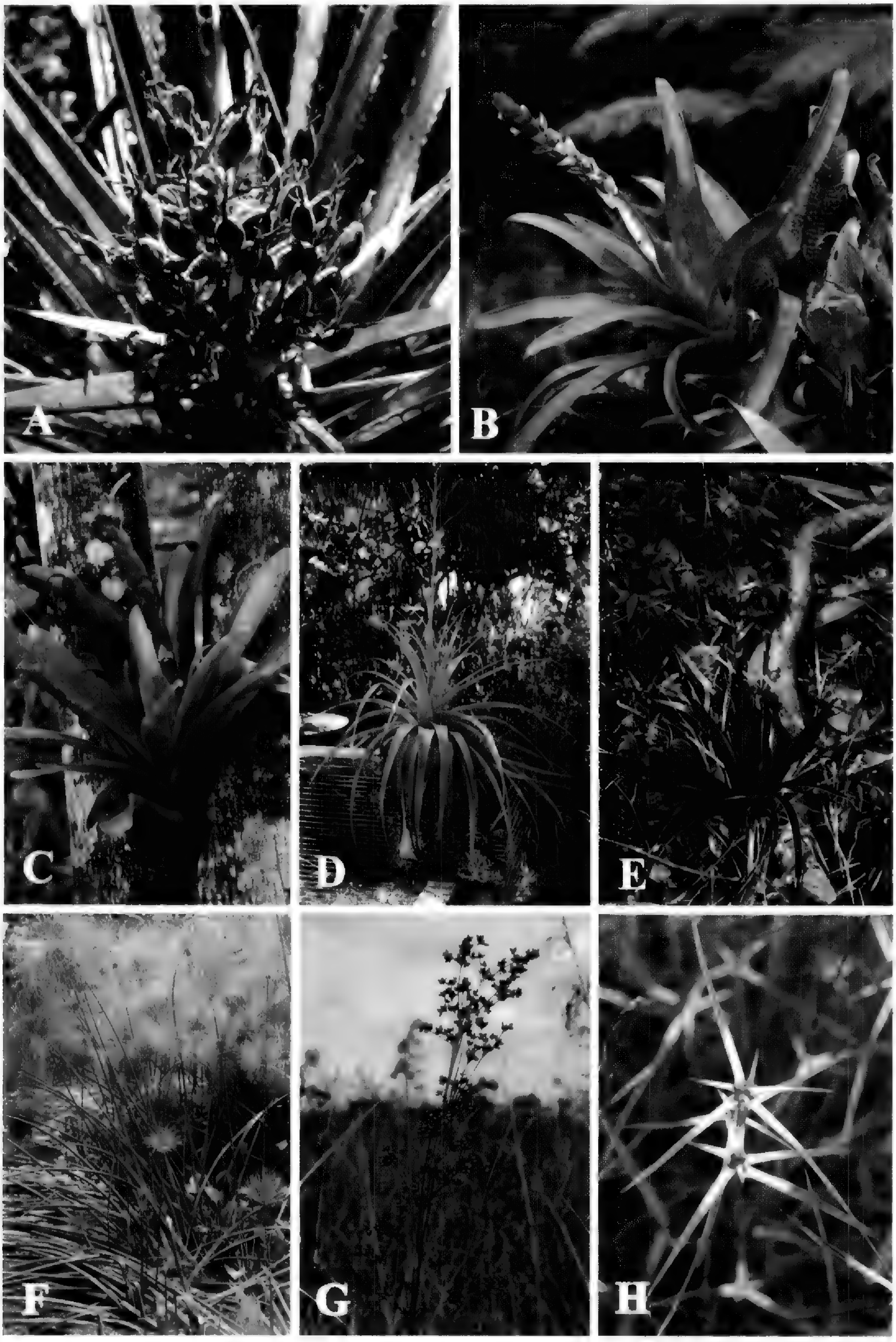


Fig. 65. A. *Bromelia pinguin*, habit. **B.** *Guzmania monostachia*, habit. **C.** *Guzmania berteroniana*, habit. **D.** *Tillandsia utriculata*, habit. **E.** *Werauhia sintenisii*, habit. **F.** *Cyperus papyrus*, habit. **G.** *Cladium jamaicense*, habit. **H.** *Rhynchospora ciliata* (A, F, unvouchered; B, from *Acevedo-Rdgz. 10739*; C, from *Acevedo-Rdgz. 10641*; D, from *Acevedo-Rdgz. 1971*; E, from *Acevedo-Rdgz. 10518*). Photos A-F by P. Acevedo-Rdgz.; G & H by R.A. Howard.

spike terminal, the pistillate one below, contiguous or separated by a short interval from the staminate spike; perianth of bristles. Staminate flowers with 1-7 (usually 3) stamens with free or united filaments, the anthers linear (all staminate structures soon deciduous). Pistillate flowers with 1-locular ovary, elongate filiform style and linear to lance-ovate or spatulate stigma. Sterile flowers often present, these on long hairy stalks ending in a swollen, abortive ovary. Fruit a minute, 1-seeded achene. A cosmopolitan family of 10 species, characteristic of non-saline to brackish wetland sites in nearly all temperate and tropical regions. All the species are included in the single genus *Typha*.

TYPE: *Typha* L.

1. TYPHA

Typha Sp. Pl. 971. 1753.

With characteristics of the family. A single species occurs in Puerto Rico and the Virgin Islands.

LECTOTYPE: *Typha latifolia* L., designated by P. Wilson in Britton, N. Amer. Fl. 17: 3. 1909.

1. Typha domingensis Pers., Syn. Pl. 2: 532. 1807. Type: Hispaniola. Collector unknown (holotype: probably at P).

Typha angustifolia sensu Britton & P. Wilson, 1923, non Linnaeus, 1753.

Fig. 57. A-F

Stems 1.6-2.5 m tall, 7-14 (-16) mm wide at base, 3-6 mm wide at apex, the sheathing bases (13-) 15-30 mm wide, terete to subcompressed, smooth, finely ribbed. Leaves 6-10; sheaths elongate, abruptly narrowed into the leaf blade at summit or rarely with a short, rounded auricle, both sheaths and blades red-lineolate at adaxial junction of sheath and blade; blades plano-convex or flattened, linear, 0.8-2.5 m × 7-12 (-15) mm, glaucous, smooth, spongy-thickened, yellowish green to pale brown, glabrous. Inflorescences exceeding the leaves; spikes pale brown to cinnamon-colored; staminate spike 20-35 × 0.9-1.8 cm long, shortly separated from the pistillate spike, with very numerous clavellate hairs subtending the flowers and fruits; pistillate spike 14-23 × 0.8-1.8 cm. Staminate flowers with 2-3 (-4) stamens, the filaments connate or sometimes distinct, the anthers 2-3.2 (-3.5) mm long. Sterile (abortive) pistils clavate, subcompressed, rounded at the apex, reticulate, 0.8-1.2 × 0.3-0.6 mm. Fertile achenes minute, narrowly elliptic.

General distribution: Southern United States, Mexico, Central America, Bermuda, Bahamas, Greater Antilles, Cayman Islands, Trinidad, and chiefly coastal South America. Apparently absent from the Lesser Antilles, despite reports.

Distribution in Puerto Rico and the Virgin Islands: This species grows in marshy or wetland habitats from low to middle elevations (Sea level to 325 m or more); it is far more common and widespread than the vouchered records indicate, because specimens are often not easy to collect. Recorded from Arecibo, Cabo Rojo, Carolina, Cataño, Ceiba, Guánica, Humacao, San Juan, and Vieques; St. Croix, St. Thomas, and Tortola.

Common name: Puerto Rico: *Eneas, Yerba de eneas.*

Note: The species of *Typha* are considered very useful in many parts of the world. The fibrous stems and leaves are used for thatch, soft matting, ropes and baskets. The downy wool of the inflorescence can be applied to wounds like cotton. The young shoots are edible, tasting when cooked like asparagus. The pollen, which is produced in great abundance, can be used like flour for baking a type of bread; it is also highly inflammable.

Selected specimens examined: PUERTO RICO: Cabo Rojo: *Sintenis 688* (US). San Juan: Martín Peña, *Stevenson 1232* (US). Guánica: *Sintenis 3936* (US).

CULTIVATED FAMILIES

ALLIACEAE

The following taxa of *Allium* were listed by Britton & P. Wilson (1923) as cultivated and generally grown for food in Puerto Rico or the Virgin Islands: *A. ascalonicum* Bory & Chaub., of Syrian origin, was occasionally grown in the Virgin Islands; *A. cepa* L., a native of Persia, was sometimes grown for food in Puerto Rico; *A. fistulosum* L., from Siberia, was cultivated in the Virgin Islands; *A. porrum* L., European, was planted for food in Puerto Rico and Virgin Islands gardens; *A. sativum* L., European, was cultivated for food; and *A. scorodoprasum* L., of European origin, was cultivated in St. Thomas.

COLCHICACEAE

Gloriosa superba L., native of the Old World tropics, was listed by Britton & P. Wilson (1923) as cultivated on St. Croix. It has also been recorded for St. Thomas: *Rose s.n.* (US).

CONVALLARIACEAE

Aspidistra lurida Ker Gawl., of Chinese origin, was occasionally grown for ornament in Puerto Rico gardens (Britton & P. Wilson, 1923).

CYCLANTHACEAE

Carludovica palmata Ruiz & Pav., native of Peru, is occasionally planted for ornament in Puerto Rico (Britton & P. Wilson, 1923).

LILIACEAE

Chlorophytum comosum (Thunb.) Jacques (native to South Africa), *Hemerocallis fulva* (L.) L. (native to Europe), *Lilium auratum* Lindl. (native to Japan), *L. lancifolium* Thunb. (native to Japan), *L. longiflorum* Thunb. (native to Japan and China), and *L. regale* E. H. Wilson (native to China) were cited by Liogier & Martorell (1982) as cultivated in Puerto Rico.

NOLINACEAE

Dasylirion glaucophyllum Hook., a native of Mexico, was cultivated in St. Thomas at Louisenhoj (Britton & P. Wilson, 1923).

PANDANACEAE

The following species of *Pandanus* were cited by Liogier & Martorell (1982) as cultivated in Puerto Rico. *Pandanus baptistii* Misonne (native to New Britain Island), *P. odoriferus* (Forssk.) Chiov. (native to southeast Asia and the Philippines), *P. pacificus* Mast. (native to New Guinea, Moluccas and Marianas), *P. tectorius* Parkinson (native to southeast Asia, Australia, Philippines and Tahiti), *P. utilis* Bory (native to Madagascar, also planted in St. Croix and St. Thomas), and *P. veitchii* Mast. (native to Polynesia).

STRELITZIACEAE

Ravenala madagascariensis Sonn. and *Strelitzia reginae* Aiton, were cited by Martorell et al. (1981) as cultivated in Puerto Rico.

TACCACEAE

Tacca chantrieri André, native to Malesia, was cited by Liogier & Martorell (1982) as cultivated in Puerto Rico.

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